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TUBERCULOSIS AMONG CERTAIN INDIAN TRIBES OF THE UNITED STATES

BY

ALEŠ HRDLIČKA

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PREFATORY NOTE

The accompanying paper by Dr. Aleš Hrdlička presents a detailed account of the investigations made by him under the joint auspices of the Office of Indian Affairs and the Smithsonian Institution, into the condition with regard to tuberculosis of five selected Indian tribes of the United States. An exhibit and a preliminary account of this work were submitted by Doctor Hrdlička to the Sixth International Congress on Tuberculosis at its session held at Washington in September and October, 1908. In the investigation above referred to, which took place in the summer of 1908, Doctor Hrdlička was assisted by Dr. P. B. Johnson, bacteriologist.

While the gravity of the conditions dealt with in this paper, from the standpoint of the physical well-being of both the Indians and the whites, is generally understood and appreciated by intelligent students of the subject, the serious and often insurmountable difficulties encountered by the Office of Indian Affairs in its task of devising and applying corrective measures are not always so readily recognized. In some cases the difficulty is the lack of necessary legislation; in some, the impracticability of exercising sufficiently close supervision over even those Indians disposed to accept the white man's counsel; in still other cases the compulsory measures which would be necessary to bring about the desired result do not have the sanction of Congress or of public opinion.

These are, briefly, a few of the obstacles which stand in the way of those who are seeking to lead the Indians in the paths of civilization and to promote their sanitary condition. Under these circumstances, it is gratifying to know that, at no previous time in its history, has the Office of Indian Affairs been more awake to the true state of affairs, and that, through its agency, as stated by Doctor Hrdlička, "improvement of existing conditions is being brought about as speedily as is practicable." Indeed, since the accompanying paper was written, changes in the service looking to the betterment of the Indian have been made, and there is every reason to expect a continuation of progress toward more sanitary living among the Indians with a consequent diminution of the ravages of tuberculosis and other diseases.

W. H. Holmes,
Chief.

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CONTENTS

	Page
I. Introduction	1
II. Morbidity and mortality	3
Table 1. Morbidity from tuberculosis among United States Indians during 1904	4
Table 2. Mortality from tuberculosis among United States Indians, during fiscal year 1907–8	5
III. Scope of investigations	7
IV. Results of investigations, by tribes	8
Menominee	8
Oglala Sioux	11
Quinaielt	14
Hupa	16
Mohave	17
Table 3. General data for tribes visited	20
Statistical data for tribes visited	24
Table 4. Results of examination (1908) of family groups	24
V. Symptomatology	28
VI. Etiology	29
VII. Therapeutics	32
Bibliography	37
Index	45

ILLUSTRATIONS

PLATE 1. Menominee village and isolated house.
2. Menominee houses.
3. Menominee houses and farm.
4. Menominee frame house.
5. Oglala dwellings.
6. Oglala tent dwellings.
7. Oglala log houses.
8. Oglala dwellings.
9. Oglala dwellings.
10. Quaitso (Queets) Indians from the Quinaielt reservation.
11. Quinaielt village of Taholah.
12. Quinaielt children; specimens of basketry.
13. Hupa dwellings.
14. Hupa dwellings.
15. Hupa frame house.
16. Hupa large frame house.
17. Hupa dwellings of the poorer class.
18. Mohave shelters.
19. Mohave dwellings.
20. Mohave dwellings.
21. Mohave dwellings and sweat house.
22. Mohave dwellings.

TUBERCULOSIS AMONG CERTAIN INDIAN TRIBES OF THE UNITED STATES

By Aleš Hrdlička

I. INTRODUCTION

The increasing prevalence of tuberculosis in all its forms among the Indians in many parts of this country demands the special attention of the student of the subject and calls for vigorous attempts to limit the spread of the infection.

It is not positively known whether or not tuberculosis existed among the natives of this continent before the advent of the whites. That it was rare, if it did exist, may be judged from the following indications: (1) No reference to the prevalence of this disease among the Indians is made by the writers who reported on the period of the earliest contact of the whites with the various tribes. (2) There are to this day among the Indians a scarcity of remedies and a lack of specialized forms of treatment for this disease. (3) In many tribes the testimony of the old Indians is to the effect that diseases of the kind were unknown or but seldom seen among them in their early days, or in the still earlier times of which information had come down to them. (4) The old men and women in many of the tribes are remarkably free from signs of tuberculosis of the lymph nodes and bones. (5) The whites who have been long in contact with the Indians, particularly in the Southwest, all speak of the spread of the disease within their memory, while the observations of explorers and men of science indicate a progressive decrease in most localities as we recede into the past. (6) As yet no bones of undoubtedly pre-Columbian origin have been found that show tuberculous lesions, and such lesions are very rare in Indian bones dating from the period of the earliest contact with the whites. (7) The Indian presents everywhere a greater susceptibility to the disease than the white man; this means a lesser immunization of his system, indicating the more recent introduction of the infection into his race. (8) It is to be assumed on purely logical grounds that the disease must have been much less frequent among the Indians in former times when they lived a more natural and active life, were better inured to hardships, and, with exception of particular localities and periods, were better provided with suitable food.

It is difficult to trace the early spread of tuberculosis among the Indian tribes, because of the meagerness of the information at our disposal. As early as 1615 [a] there occur references to diseases of the "chest"—some of which may have been of a tuberculous nature—among the Tarasco of Michoacan. In the seventeenth and eighteenth centuries, especially the latter, both scrofula and consumption were, according to the Jesuit fathers, [b] already common among the Montaignes and other tribes in New France.

Of the spread of the disease through the remaining tribes but little is known until we come down into the nineteenth century. As late as 1794 such an authority as Dr. Benjamin Rush, whose knowledge was probably limited to the eastern Indians south of Canada and New England, states that tuberculosis "is unknown among the Indians in North America." Similar reports will be found in the Bibliography. By the end of the first quarter of the nineteenth century, however, the disease was certainly widely disseminated, though still rare, according to Long, Hunter, Morton, and others, among the Indians of the Central states and the Missouri valley. Before the century closed it existed in all parts of the country, and at the present time no tribe in the whole of North America is exempt.

The special study of tuberculosis among the Indians in the United States is a matter of recent years only, dating, in fact, from the establishment, about twenty-five years ago, of the regular Indian medical service. Unfortunately, there are as yet in existence no exact and comprehensive data on the subject. The physicians in the Indian Service report regularly on all the diseases treated, but the reports have not always been complete or accurate. The first extensive published statistics relating to tuberculosis in Indians are found in the United States Census reports, particularly those for 1890 and 1900, but these also can not be regarded as entirely satisfactory for the purpose in view. Original research in this subject may be said to have been begun in the "eighties" by Dr. Washington Matthews.[c] Subsequent to this, in 1894, Dr. H. R. Bull published observations on the disease among the pupils of the large nonreservation Indian school at Grand Junction, Colo. A series of valuable notes and data on pulmonary tuberculosis among the Pine Ridge Sioux, collected during the last fifteen years, was reported by Dr. J. R. Walker in 1906, before the National Association for the Study and Prevention of Tuberculosis. In the same year an account of the disease in Arizona and New Mexico, based on special reports of the agency and school physicians, was published by Dr. I. W. Brewer, and one year later an interesting paper in this line by Dr. Woods Hutchinson[c] ap-

[a] Hernandez, F., and F. Ximenez, Plantas, Animales e Minerales de Nueva España, usados en la Medicina. Mexico, 1615; Leon ed., Morelia, 1888.

[b] Jesuit Relations, Thwaites edition; see Bibliography.

[c] See Bibliography.

peared. Since 1900 inquiries as to the disease have also been made among the various tribes of the Southwestern states and northern Mexico by the writer. In 1904, under the auspices of the Indian Office, he collected from its physicians information as to the morbidity due to tuberculosis among all the Indians of the United States. The results of these studies have recently appeared as Bulletin 34 of the Bureau of American Ethnology. At the beginning of last summer a further step was taken by the Indian Office in calling on its physicians for statistics as to the morbidity and mortality due to tuberculosis among the Indians during the fiscal year 1907–8. Finally, in preparation for the Sixth International Congress on Tuberculosis, the Indian Office and the Smithsonian Institution united in asking the writer to formulate a plan for a brief, direct research into the subject in a number of selected tribes, and detailed him, with Dr. P. B. Johnson, bacteriologist, to carry out the investigation. The results of this were presented to the congress in the form of an exhibit and a preliminary communication, and are detailed more fully in this paper.

II. MORBIDITY AND MORTALITY

The most extensive data concerning the prevalence of tuberculosis among the Indians are (1) the census reports, (2) the above-mentioned statistics on the morbidity due to tuberculosis, collected by the writer from physicians in the Indian Service in 1904, and (3) the statistics on mortality from the disease gathered by the Indian Office during the present year (1908). No one of these series of data is perfectly accurate, particularly with regard to the larger reservations, where it is impossible for the physician to know of all the cases. Still, they are sufficiently valuable to deserve publication in this connection.

The data on the morbidity due to tubercular conditions included 91 acceptable reports, dealing with an Indian population of 107,000 individuals. These reports recorded 2,836 cases of the disease, divided as follows: pulmonary tuberculosis, 1,038; tuberculosis of bones and joints, 208; glandular tuberculosis, 1,590; or to every 100 cases of pulmonary tuberculosis there were 20 cases of tuberculosis of bones and joints and 153 of the glandular variety.

The proportion of the several forms of the disease to the population was as follows:

	Cases per 1,000.
Pulmonary tuberculosis	9.7
Tuberculosis of bones and joints	1.95
Glandular tuberculosis	15.0

The detailed data are subjoined. Following these are the 1908 statistics on the mortality from tuberculosis, which are doubtless of greater accuracy than the previous ones. The two series, however, show a fair general agreement.

TABLE 1.—*Morbidity from tuberculosis among United States Indians during 1904*

Designation.	Agency or school, with location.	Cases of tuberculosis per 1,000 population.		
		Pulmonary.	Bones and joints.	Glandular.
Hupa	Hupa Valley Agency, Cal	60.4	24.2	193.2
Menominee	Green Bay Agency, Wis	58.4	1.6	32.7
Quinaielt	Puyallup Agency, Wash	36.2	.....	14.5
Sioux (Oglala)	Pine Ridge Agency, S. Dak	30.8	6.8	57.7
Sioux	Lower Brulé Agency, S. Dak	29.8	4.2	42.5
Sioux (mixed)	Rosebud Agency, S. Dak	29.7	.....	26.1
Mohave	Colorado River Agency, Ariz	29.5	.....	11.8
Sioux (Lower Yanktonai)	Crow Creek Agency, S. Dak	26.3	.9	34.1
Ute	Ute Agency, Utah	25.3	6.3	37.9
Assiniboin and Sioux	Fort Peck Agency, Mont	24.2	4.2	15.7
Oto	Oto Agency, Okla	21.9	.....	2.8
Sioux (Yankton)	Yankton Agency, S. Dak	21.7	2.3	5.8
Cheyenne	Cantonment, Okla	18.9	5.4	38.1
Cheyenne	Tongue River Agency, Mont	17.0	.....	.....
Paiute	Nevada Agency, Nev	16.3	3.2	8.1
Apache	Mescalero Agency, N. Mex	15.2	4.3	8.7
Iroquois (Oneida)	Oneida School, Wis	13.3	.....	80.3
Crows	Crow Agency, Mont	13.1	.5	18.6
Potawatomi	Shawnee, Okla	13.1	.....	.....
Hopi	Hopi Agency, Ariz	12.7	13.8	9.1
Indians	Shawnee Agency, Okla	12.6	.....	.....
Walapai	Truxton Canyon Agency, Ariz	9.7	5.8	31.1
Sauk and Foxes	Sauk and Fox Agency, Okla	8.6	.....	.....
Arapaho	Cantonment, Okla	8.4	16.9	29.5
Pawnee	Pawnee Agency, Okla	8.2	1.6	14.8
Sioux	Devils Lake Agency, N. Dak	7.9	1.9	42.4
Shoshoni	Western Shoshoni, Nev	7.8	9.8	17.6
Indians	Umatilla Agency, Oreg	7.5	.8	37.6
Shoshoni and Bannock	Fort Hall, Idaho	7.4	3.7	8.1
Quileute	Neah Bay Agency, Wash	6.9	.....	1.3
Pima	Pima Agency, Ariz	6.5	1.1	12.7
Indians	Round Valley, Cal	6.2	3.1	4.6
Winnebago	Winnebago Agency, Nebr	6.5	1.8	5.5
Kickapoo	Kickapoo School, Kans	5.0	5.0	10.1
Indians	Flathead Agency, Mont	4.9	2.7	4.9
Piegan	Blackfeet Agency, Mont	4.8	2.9	8.3
Sioux	Standing Rock Agency, N. Dak	4.5	2.0	22.7
Shoshoni	Lemhi Agency, Idaho	4.3	6.4	.....
Indians	Colville Agency, Wash	4.2	5.9	32.5
Cheyenne and Arapaho	Cheyenne and Arapaho Agency, Okla	3.9	2.3	12.3
Cœur d'Alènes	Colville Agency, Wash	3.5	1.7	13.8
Apache	Fort Apache Agency, Ariz	3.4	.5	3.9
Shawnee	Shawnee School, Okla	3.4	1.7	.....
Yuma	Fort Yuma School and Reservation, Ariz	3.1	1.5	(?)
Chippewa	Leech Lake Agency, Minn	2.9	.....	7.4
Indians	Fort Berthold Agency, N. Dak	2.5	.8	4.1
Assiniboin and Grosventres	Fort Belknap Agency, Mont	2.4	3.2	8.1
Omaha	Omaha Agency, Nebr	2.3	2.3	16.3
Mohave	Fort Mohave School, Ariz	2.2	1.1	6.7
Iroquois (Oneida)	Oneida Agency, Wis	1.4	.5	7.3
Apache	Jicarilla Agency, N. Mex	1.3	.....	1.3
Shoshoni and Arapaho	Shoshoni Agency, Wyo	1.2	.....	.6
Navaho	Navaho Agency, N. Mex	.9	.6	.2
Navaho	San Juan Agency, N. Mex	.6	.....	.1

TABLE 2.—*Mortality from tuberculosis among United States Indians, during fiscal year 1907–8* [a]

Tribe.	Agency or school.	Census June 30, 1907.	Deaths from pulmonary tuberculosis.					Deaths from tuberculosis other than pulmonary.
			For year 1907–8.	Proportion per 1,000 population.	Males over 16 years. [b]	Females over 16 years.	Children under 16 years.	
Apache	Kiowa, Okla	159	4	25.1	1	1	2	.....
Chippewa	Red Lake, Minn	1,324	31	23.4	3	5	23	3
Cheyenne and Arapaho.	Cheyenne and Arapaho, Okla.	1,276	28	21.9	12	13	3	4
Siletz Indians	Siletz, Oreg	448	8	17.9	3	2	3	2
Santee Sioux and Ponca.	Santee, Nebr	1,374	24	17.5	9	8	7	4
Grosventres	Fort Belknap, Mont	553	9	16.3	2	2	5	.....
Tulalip	Tulalip, Wash	402	6	14.9	2	2	2	8
Sioux	Standing Rock, N. Dak	3,393	50	14.7	11	19	20	13
Sioux	Rosebud, S. Dak	5,011	70	14.0	26	27	17	33
Paiute	Panguitch, Utah	223	3	13.5	1	.....	2	2
Cœur d'Alènes, etc.	Cœur d'Alène, Idaho	601	8	13.3	1	1	6	3
Muckleshoot	Tulalip, Wash	155	2	12.9	1	1	.....	.....
Oglala Sioux	Pine Ridge, S. Dak	[c] 4,099	51	12.4	18	27	6	14
Mohave	Colorado River, Ariz	482	6	12.4	4	2	.....	1
Port Madison	Tulalip, Wash	174	2	11.5	2	.....	.....	.....
Wichita	Kiowa, Okla	441	5	11.3	3	2	.....	1
Comanche	Kiowa, Okla	1,440	16	11.1	4	6	6	.....
Paiute	Walker River, Nev	469	5	10.7	4	1	.....	.....
Assiniboin	Fort Peck, Mont	561	6	10.7	3	2	1	3
Arikara	Fort Berthold, N. Dak	389	4	10.3	1	2	1	.....
Oto	Otó, Okla	390	4	10.3	3	1	.....	.....
Shoshoni	Western Shoshoni, Nev	488	5	10.3	2	2	1	2
Yanktonai Sioux	Fort Peck, Mont	1,145	11	9.6	4	5	2	6
Hupa	Hupa, Cal	424	4	9.4	1	2	1	2
Southern Ute	Fort Lewis, Colo	453	4	8.8	2	1	1	.....
Apache	Mescalero, N. Mex	466	4	8.6	3	.....	1	1
Apache	San Carlos, Ariz	2,191	18	8.2	4	11	3	.....
Menominee	Green Bay, Wis	1,375	11	8.0	6	2	3	1
Bannock and Shoshoni.	Fort Hall, Idaho	1,782	14	7.8	5	8	1	2
Chippewa	La Pointe, Wis	5,081	39	7.7	14	11	14	42
Yanktonai Sioux	Yankton, S. Dak	1,716	13	7.6	4	3	6	4
Mandan	Fort Berthold, N. Dak	263	2	7.6	1	.....	1	.....
Navaho	Hopi, Ariz	2,000	15	7.5	6	6	3	.....
Swinomish	Tulalip, Wash	273	2	7.3	1	1	.....	.....
Hopi	Hopi, Ariz	2,000	14	7.0	3	5	6	.....
Ute	Uinta and Ouray, Utah	1,261	9	7.1	4	5	.....	1
Lower Yanktonai Sioux.	Crow Creek, S. Dak	1,028	7	6.8	2	1	4	2
Winnebago	Winnebago, Nebr	1,065	7	6.6	1	6	.....	.....
Round Valley Indians.	Round Valley, Cal	620	4	6.5	2	1	1	.....
Kiowa	Kiowa, Okla	1,235	8	6.5	4	1	3	1
Ponca and Tonkawa.	Ponca, Okla	627	4	6.4	1	3	.....	1

[a] Compiled from special statistics gathered by the Indian Office from agency physicians.
[b] Indian Office classification.
[c] Of the four districts to which the statistics apply.

TABLE 2.—*Mortality from tuberculosis among United States Indians, during fiscal year 1907–8*—Continued

Tribe.	Agency or school.	Census June 30, 1907.	Deaths from pulmonary tuberculosis.					Deaths from tuberculosis other than pulmonary.
			For year 1907–8.	Proportion per 1,000 population.	Males over 16 years.	Females over 16 years.	Children under 16 years.	
Grosventres	Fort Berthold, N. Dak.	468	3	6.4	1	.....	2	.....
Sioux	Fort Totten, N. Dak.	986	6	6.1	2	3	1	.....
Pima, Papago, and Maricopa.	Pima, Ariz.	6,478	37	5.7	12	15	10	18
Sauk and Foxes, and Iowa.	Sauk and Fox, Okla.	608	3	4.9	1	1	1	.....
Omaha	Omaha, Nebr.	1,246	6	4.8	3	2	1	1
Lummi	Tulalip, Wash.	414	2	4.8	.....	1	1	.....
Caddo	Kiowa, Okla.	555	2	3.6	2	.....	.....	2
Apache	Fort Apache, Ariz.	2,083	7	3.4	3	1	3	.....
Flatheads, etc.	Flathead, Mont.	2,221	7	3.1	3	4	.....	3
Pueblos	Santa Fé, N. Mex.	3,419	7	2.0	4	3	.....	1
Eastern Cherokee	Eastern Cherokee, N. C.	1,550	3	1.9	1	1	1	.....
Navaho	Navaho, Ariz.	12,500	21	1.7	6	6	9	2
Total	.....	81,388	641	[a]7.9	222	235	184	[b]182

[a] Among the whites of the United States the average proportion of deaths from pulmonary tuberculosis per 1,000 population is approximately 1.7; among the negroes about 4.

[b] 2.2 per 1,000 population.

The above statistics show:

(1) That the morbidity and mortality from all forms of tuberculosis among the Indians to-day exceed by far those among the whites generally; and that their average exceeds even the very high rate among the American negroes.

(2) That the disease, while most prevalent in northern and northwestern United States and in certain regions in Oklahoma, presents no definite distribution according to territory and climate. Nearly all of the tribes that have long been in contact with the whites, and that have advanced more or less in civilization, are seriously affected. On the other hand, most of the least affected tribes have been less in contact with the whites and live not only in a favorable climate, but also, to a large degree, in their native manner. Judging from the Pueblos, who are among the tribes most free from tuberculosis, the contact of the Mexicans was not as detrimental as was that of the whites from the east and north of the continent. The natives most free from tuberculosis—the Navaho—occupy an extensive and naturally healthful region, where they live under conditions more nearly aboriginal than those found in any other locality north of Mexico. The tribe no doubt suffers more from tuberculosis than is indicated in the reports of the Indian Office, for the size of the territory and the

number of its people make it impossible as yet to obtain exact data. Still, there are many indications that in this tribe the proportion of tuberculous cases is very small where contact with the whites is restricted. An exception is found among the Navaho on the Hopi reservation, who already show infection to about the same extent as the Hopi themselves.

III. SCOPE OF INVESTIGATIONS

The investigations on which this report is based were pursued in five of the tribes, shown in the above-mentioned data to be most afflicted with tuberculosis, and in one of the large nonreservation schools. The tribes in question are the Menominee in northeastern Wisconsin; the Oglala Sioux in South Dakota; the Quinaielt on the seacoast and along the river of the same name in northwestern Washington; the Hupa in northwestern California; and the Mohave, on the Colorado river between Needles, Cal., and Yuma, Ariz. These tribes were selected not only because of the prevalence among them of tuberculosis, but also because they live under widely differing conditions of climate, environment, civilization, and contact with the whites. The school visited is the one at Phoenix, Ariz. The investigation was carried on during the two months of midsummer when people everywhere are most free from the various bronchial and pulmonary affections that might complicate a diagnosis.

On account of the short time available, and the extensive ground to be covered, the study had to be limited to what was most essential toward obtaining reliable statistics. In the smaller tribes, as the Hupa and the Mohave, nearly all the dwellings were visited, and all the members of the tribe who were not far distant were studied. In the larger tribes, as the Menominee and the Oglala, the examinations were limited to one hundred families. Among the Oglala, these one hundred families included only full-bloods, who in this tribe suffer more from tuberculosis than do the half-breeds.

The actual work consisted in visiting the dwellings consecutively and making a personal examination of each member of every family, healthy or not healthy. In many families absent members were brought from many miles away by the Indians themselves for examination. This examination embraced the lungs, heart, glands of the neck, and skeleton, and was supplemented by inquiries. Whenever a case was encountered in which the presence of phthisis seemed probable, an effort was made to secure a sample of the sputum. This was sent back to the bacteriologist, who had meanwhile established himself in a convenient place at the agency. A satisfactory sample of sputum was not always obtainable, however, and it was seldom possible to secure more than one specimen from the same subject. Tuberculin tests and opsonic determinations, though very

desirable, could not be employed on account of the short time available. The writer is well aware that in their absence his work is incomplete and not fully satisfactory. Nevertheless, the results can be safely regarded as more accurate than any secured hitherto by general observation.

The investigation was everywhere promoted by the Indians themselves, who welcomed an inquiry into the disease which is decimating them, the gravity of which they well appreciate, but against which they feel utterly helpless.

IV. RESULTS OF INVESTIGATIONS, BY TRIBES

The results will be presented in as brief form as is consistent with their importance. They consist of general data regarding the actual state of the different tribes, and statistical data based on the examinations made.[a]

MENOMINEE

The Menominee, according to the latest census, number 1,464 individuals, of whom 784 are males and 680 females. The excess in number of males over females is not natural, but is mainly due to the fact that remnants of related people living in the neighboring tribes apply for and receive admission into the tribe and more males than females are admitted. Were it not for this accession, the Menominee, notwithstanding a high birth rate, would show a gradual decrease in numbers as a result of the high mortality largely caused by tuberculosis.

These Indians occupy parts of an extensive reservation in northeastern Wisconsin, about 50 miles west of Lake Michigan. They have lived in the same general region since our first knowledge of them, and may be considered, therefore, as well inured to its climatic peculiarities. The surface of the reservation is partly flat and partly of an irregular, rolling character, with many small hills and depressions. Much of the land is covered with mixed woods, in which pine predominates. The soil is sandy and clayey. Water is very abundant, there being more than thirty small lakes and several fair-sized rivers; there are no undrained bodies of water or swamps. The water in most of the lakes contains traces of iron and lime, but no sulphur.

The climate is rather moist and cool. There is no dry season; the rains are particularly abundant in spring and fall, lasting sometimes upwards of a week at a time; snow is also plentiful. The temperature rarely rises higher than 85° F. in summer and drops, though not frequently, to as low as 30° below zero in winter. Winter begins usually late in November and ends during the latter half of March. Winds are highest from March to June. They blow mainly from

[a] In this connection the writer expresses his indebtedness for valuable assistance, to the agents and the agency physicians of the several reservations.

the west and northwest and are seldom of more than moderate velocity. There are no sand storms. In general, the climatic conditions are such as to favor the development of catarrhal affections of the respiratory organs in both whites and Indians.

The Menominee are to-day almost wholly a tribe of mixed-bloods. Among more than five hundred members of the tribe with whom the writer came in direct contact not more than two aged individuals had the appearance of pure-blood Indians. Much of the mixture dates from the time of the relations of the people with the French, but regular marriages of white men and even of women into the tribe have not been rare and occasionally occur at the present day.

The people are, in general, well advanced in civilization; this is especially true of those in the neighborhood of the agency. The majority live in fairly good log or frame houses, built according to the plans of the whites. (Pls. 1–4.) These dwellings are, as a rule, isolated, and surrounded by good-sized gardens, or by vacant grounds on which grow forest trees. The floors of the houses are, with few exceptions, made of boards, lumber being abundant.

The log dwellings are warmer than the frame houses. In a number of instances the latter seemed rather frail in construction, and must be cold in winter. All of the dwellings admit of good ventilation and there is little fault to find in this respect in summer, in the day time especially. At night, however, the windows and doors are habitually closed, and in cold weather every crevice is stopped, and then, doubtless, the conditions are insanitary. As to cleanliness, a majority of the dwellings were found in a fairly good condition.

The clothing of the people is quite clean, being similar to that of the whites. There was observed, however, a tendency to wear too much clothing even on the warmest days of the summer. It was not uncommon to find a child or a grown person wearing two, or even three shirts, one of which was not infrequently of wool. This habit is injurious; many of those so thickly clothed were found perspiring, and oversensitive to exposure.

For food, the Menominee prefer meat, especially salt pork, which is very extensively eaten. The writer observed their meals on numerous occasions, and found them to be less regular than among the whites and often poor in every respect; only occasionally was a really well-provided table seen. Gravies and pastries are much favored; coffee and tea are drunk in large quantities, often at the expense of more nourishing substances; and everyone seems fond of sweets. Beans and other garden products are liked, but the supply is small. Some of these Indians catch a fair quantity of fish, while others raise a few chickens. Game is scarce. During spring and summer large quantities of berries of different kinds are gathered to be eaten fresh or dried, or to be made into preserves.

The chief occupations of the Menominee are logging and lumbering, which furnish work to nearly all able-bodied male Indians for seven or eight months each year. During this "season," which lasts from the time cold weather sets in until late in the spring, there is but little idleness among the men who can work. But this period is not without its dangers to their health. Those employed at logging are frequently wet, while some use intoxicants more freely during this time and expose themselves to the weather. As a result, attacks of rheumatism often follow, which, in many instances, leave those affected, with defective hearts. The proportion of those so affected—principally with mitral insufficiency—is almost incredibly large in this tribe, amounting to more than 30 per cent of the population. The lesions are found chiefly in men who have been engaged in logging, but occasionally in women; they were observed invariably in one or more children of a family in which the father or mother was affected with heart trouble for a time antedating the birth of such children. However, the individuals thus afflicted have not shown any greater percentage of tuberculosis than others.

Farming is neglected on account of the work in the woods and saw mills, yet all cultivate a little ground. (Pl. 3.) The women occupy themselves only with household duties and some gardening.

In July, 1908, the Menominee owned about 165 cows. The milk is used principally fresh, or in bread, or is eaten sour with addition of sugar. None of these cows had ever been examined for tuberculosis. Some of them, kept by the people who live in Keshena, the settlement about the agency (pl. 1), were seen daily on the main street of the village, browsing on grass which undoubtedly is often contaminated by the expectorations of the healthy as well as of the consumptives.

In their general habits the Menominee are a mild, tractable, and domestic people, who, under more favorable conditions, could soon take their place among free citizens. Their main failing is drunkenness which, notwithstanding punishments and precautions, continues to prevail. Liquor is obtained surreptitiously from whites; this consists of whiskey of inferior grade and occasionally of alcohol, the latter more or less diluted. A creek near the reservation, which conveniently furnishes water used by the Indians for dilution of alcohol, is already known as "Alcohol creek." The passion for strong drink affects both men and women. Its main causes are, in a few cases, early dissipation, and in others, a craving for a stimulant of some sort, due to lack of sufficient or proper nourishment. The results are injurious, particularly as regards tuberculosis.

The diseases most prevalent on the reservation, besides tuberculosis and the above-named heart affections, are various disorders of the respiratory apparatus, and rheumatism; malarial affections are comparatively rare.

Oglala Sioux

This tribe occupies a reservation in South Dakota nearly 5,000 square miles in extent. It numbers according to the last count 6,663 individuals, of whom 3,325 are males and 3,328 females. The population is suffering a gradual diminution owing to the high death rate, due mainly to tuberculosis.

About three-fifths of the Oglala are still full-bloods, the remainder being nearly all half-breeds, the result of clandestine unions of the Indian women with white men. This mixture is nearly all of quite recent date. The writer examined in this tribe 100 pure-blooded families.

The region in which the Oglala live, while not identical with the one over which they roamed when free, is, nevertheless, quite similar in essential points, so that change of climate need not be considered in discussing the morbidity of the tribe, particularly that due to tuberculosis. The reservation is, for the most part, gently rolling in the south, and broken and hilly farther north, while the northwestern portion presents, on an extensive scale, the characteristic barrenness of the Bad Lands. There are no mountains. The average altitude is somewhat more than 3,000 feet. Though there are no forests, scattered pines are found on the ridges, and other trees along the waterways. The soil on the elevations is sandy or gravelly and for the most part barren, but the valleys along the creeks and rivers are filled with fertile silt. Water is not abundant, there being no large rivers and only a few small shallow lakes. Drinking water is obtained mainly from the creeks and from springs; it is of fairly good quality, containing little or no alkali.

The annual precipitation averages about 25 inches, but varies much in different places and seasons. There are no fogs, and dew is observed but seldom. Snow is rarely deep, except in drifts. The country is hot in summer, when the thermometer rises occasionally above 100° F., and cold in winter, the mercury falling as low as 40° below zero. The nights, as a rule, are cold, even in summer. A strong breeze usually prevails, and there are occasionally high winds.

In regard to civilization, the Oglala are in the transition period, which generally means partial degeneration. They live in small or fair-sized log houses of one room, each provided with one or two small windows that are never opened. The houses have earthen floors and sod roofs. In summer almost every family constructs from poles and boughs, or from young pine trees, a more or less open shelter in which, while it is warm, they spend most of their time. Usually, each family has also a light, easily portable tent, which represents the ancient tipi. These tents are erected near the house and are occupied by the aged, by some relative or visitor of the

family, or serve to sleep in. When the family leaves home, such a tent is packed, together with bedding, kitchen utensils, etc., into the wagon, and is pitched whenever a stop is made for the night. Indeed, there will be at times one or more villages of these tents near the agency, or about a house where some particular feast is being given. In summer these tents are oppressively hot during the day, though they become cool if the sides are raised. As they are made of very light fabric, they are cold at night, and afford but poor protection during a severe rain or hail storm, as the writer personally experienced. (Pls. 5–9.)

The dwellings of the various families are generally isolated and in many localities far apart. Along the creeks and rivers they dot the low elevations. In fair weather, especially in the daytime, there is no lack of fresh air, even in the log houses. When it becomes cold, however, the families retire to their log structures, close all apertures and crevices, and make fires. In this confined and overheated atmosphere they spend a large portion of their days and nights, without ventilation other than that caused by the opening of the door as some one enters or leaves. There will be, at times, a dozen or more persons in a room under such conditions. However, the most dangerous features about these dwellings are the earthen floors and the general uncleanliness of the people. The earth of the floors is but little solidified. The healthy, as well as the sick, among whom are consumptives, expectorate freely on these floors, covering their sputum usually with a pinch of earth. In this manner the floors are probably all infected with the tubercle bacillus. Even if the family itself should be healthy, it is sure to be visited eventually by consumptives who distribute the infection. The dry, fine dust of the floor readily floats in the air, where it is inspired by children as well as adults. This is doubtless one of the principal causes of the spread of the disease on this reservation. Besides this, the furnishings of the dwellings, as blankets, bedding, bags and woolen clothing, are generally found to be more or less filthy. Many such articles come in direct contact with the floor and, especially in houses where there are consumptives, become, in course of time, soiled with infected dirt or sputum. The dust from such articles is undoubtedly dangerous to health.

As to clothing, the Oglala now dress like the whites in most respects, though the majority still persist in wearing moccasins. The women wear leggings and always a blanket or shawl when going about. A tendency to wear too much clothing, even on the hottest day, was again noticed and is very prevalent. This is due partly to ignorance and partly to vanity. The garments are usually far from clean. The writer learned of several instances in which the clothing of tuberculous persons was given or sold to others.

In diet the Sioux are chiefly meat eaters, the principal kind of meat consumed being beef. They cook this fresh or cut it into strips and dry it on cords stretched outside their dwellings. Other common articles of diet are badly made wheat bread and large quantities of coffee. When they have money they purchase crackers and canned foods. They eat very irregularly, both as to time and quantity. During feasts and when visitors are present they not infrequently use the same wooden spoon or other utensil, one after another, and eat from the same dish, the bones and other remnants being freely strewn over the floor.

In many of the dwellings it was seen that the denizens lack in both quantity and quality of food on account of their poverty. This affects the adults, especially the aged, more than the children. Numerous cases were seen where the whole meal consisted of a few crackers and black coffee. In several instances cattle which had died of disease had been consumed, both flesh and viscera. According to the resident physician, Doctor Walker, the Oglala eat not only cattle but even horses and dogs that die of disease. The people are not emaciated; in fact, many look well nourished. Yet there is no doubt that many do not receive, except on rare occasions, all the nourishment they require. This doubtless induces indolence and disease. It would also strongly promote the spread of alcoholism, but fortunately there are very few chances for obtaining liquor on or near the reservation.

Few of the Oglala men have any steady occupation. They do very little farming. During the summer they cut some hay in the valleys, which brings fair prices. Cattle and horses are being distributed by the Government to the different families, and stock raising is being encouraged with some success. With certain families it already constitutes an important item of sustenance. This occupation affords the men, and also some of the boys and girls, much needed exercise of the best kind. A small percentage of the men are employed about the agency and school, while others go off the reservation to theaters and circuses, or for other employment. The women are occupied almost exclusively with housework. Notwithstanding these opportunities for working, many men in the tribe were seen by the writer to be idle. Of these, many were traveling in their wagons in a seminomadic fashion, bent mostly on visiting; this is not, of course, a desirable condition from the sanitary point of view.

The people of this tribe are quite shrewd, tractable, and glad to be instructed, though the instruction given does not always have practical results. Their most striking peculiarities are the above-mentioned tendency to a seminomadic life and the disinclination to steady manual work. They are very ignorant of all matters regarding hygiene. One of the most reprehensible customs among them is the

so-called "passing of the pipe." Whenever a number of men have gathered in a house, there is passed from mouth to mouth a lighted pipe, the mouthpiece of which is never cleaned. As there is often in such a group an individual in the earlier stages of consumption, the habit must be regarded as providing a direct mode of infection with the disease.

Drunkenness is infrequent on the reservation, owing to the scarcity of liquor.

QUINAIELT

This small tribe, which on June 30, 1907 numbered only 141 individuals, lives on a relatively large and thickly wooded reservation along the seacoast and about the Quinaielt river and lake in northwestern Washington. The Quinaielt are a branch of the Coast Indians of that general region, and the data concerning them, in this paper, apply equally to the related groups situated farther north, on the peninsula. (Pls. 10, 12.)

The Quinaielt are quite advanced in civilization. They live in frame dwellings, the newest of which are, both in architecture and furnishing, comparable with similar dwellings among us. They dress as do the whites, and each family is provided with various utensils and other articles of civilized manufacture.

The reservation is an extensive flat, elevated but little above the sea, and overgrown with an almost impenetrable primeval forest, in which spruce and hemlock predominate. The Indians are settled in a village (pl. 11) at the mouth of the Quinaielt river, and in scattered dwellings along this river and about Quinaielt lake. The village consists of about twenty frame houses, built close together, but without crowding. On account of the immense amount of labor involved, and because of the abundance of food in the water, the Indians have cleared but little of the land, and cultivate this on a very limited scale.

The climate of the region is not very agreeable. The temperature never rises high, nor does it fall very low, but the air is often chilly and raw, even in summer. The summers are rainless, but many of the days are foggy, and on such days the mornings and evenings are unpleasantly cold. From September to May or June is the rainy season, during which precipitation is very frequent and abundant, the average rainfall being usually well above 100 inches. During the winter there are occasional severe windstorms. There is but little snow, and this does not remain long. Frosts are rare and light. The amount of sunshine which the Quinaielt receive in the course of the year is decidedly below the average. The sea water is cold the whole year.

The Quinaielt are domestic, mild-mannered, and tractable. The men of the tribe are almost exclusively fishermen. They depend particularly on the annual run of the highly valued Quinaielt salmon,

catching them by means of seines in the river, which is partitioned for this purpose among the various families. They catch also an abundance of smelt in the surf about the mouth of the river. These are taken with a hand seine, fastened to a small pole, the Indians wading barelegged into the cold surf and getting wet and chilled. Most of the fish caught, particularly the salmon, are readily sold at fair prices. The people clear annually from several hundred to more than a thousand dollars per family for the salmon alone. Considerable quantities of smelt are also sold. With the money thus obtained the people buy a portion of their food, their house furnishings, and not infrequently luxuries (gramophones for example). No cows are kept in the tribe, but all have wagons and the necessary horses.

The women, besides being occupied with their housework, make many decorated baskets, which are sold to tourists. As the demand for these is always greater than the supply, they derive from this source an important addition to their incomes. (Pl. 12.)

The food of the Quinaielt consists principally of fresh, dried, salt, and smoked fish. No evidence of actual want was seen in any of the houses, but there is more or less irregularity about meals, which are not properly prepared. Salt fish seen on some tables smelt so bad that one unaccustomed to such diet would be unable to eat it. Remnants of food, some of which are to be utilized at the next meal, are exposed for a long time on the table, regardless of the flies. In every house the members of the family, including the sick, expectorate freely on the floor, only exceptionally using a tin can for the purpose. The flies feed very largely on the sputum, and there is certainly a great deal of infection carried by them to the food left on the table. This feature undoubtedly has a bearing on the morbidity of the people. As in their houses, so also in their persons—they are deficient in cleanliness without being actually filthy. They have apparently only the most elementary ideas of hygiene. The sick are not isolated in any way, and consumptives live in the midst of their families and work as long as they can. A woman, far advanced in the disease, coughing and expectorating very frequently, was seen in one of the houses making baskets for tourists, and doubtless this was not a very exceptional case. As their manner of making these baskets requires the wetting of the fibers in the mouth, and as there is no subsequent disinfection of the basket when finished, doubtless not a few of those sold to tourists carry abundant and dangerous infection.

The treatment of the sick in this tribe is very defective. The tribe being small and isolated, there is no agency physician, and no other white physician within a distance of many miles. As a result, medical help depends very largely upon the abilities and supplies of the resident teacher and of the two or three native medicine-men. Under such circumstances but little can be done against the spread of tuberculosis.

HUPA

The Hupa, 426 in number, occupy a narrow but beautiful and fertile valley, 350 feet above sea level, in northern California. The valley is divided throughout its entire length by the Trinity river, and is surrounded by thickly wooded mountains of moderate height.

This region is hot in summer, the temperature in the daytime often exceeding 100° F. in the shade. In winter it is chilly and wet. The evenings and nights are always cool. There are well defined dry and rainy seasons. The latter season lasts from November to April, and the precipitation is very frequent, as well as abundant. Occasionally there is a slight fall of snow, which, however, does not remain longer than a few hours. The latter part of the winter is unpleasantly chilly, and favorable to the development of tonsilitis, rheumatic disorders, and especially catarrhal affections of the respiratory tract.

More than one-fourth of the Hupa show admixture with whites. Among the pure-bloods there are individuals who came from remnants of other tribes in the neighborhood. The Hupa are well advanced toward civilization, particularly the younger element. Almost all understand English, and many speak it. They live in frame houses, built like those of the whites, with plenty of windows, and containing generally more than one room. The houses are heated, as a rule, with modern ranges, only two of the old ones having been found with open fireplaces. Earth floors are seen in only a few of the oldest homes. In a majority of cases the houses were found both well ventilated and fairly clean. Squalor prevailed only in a few of the poor dwellings and in those occupied by the aged, some of whom were too debilitated to be able to give proper care to their rooms. The dwellings (pls. 13–17) are generally isolated, though in a few localities in the valley they are grouped. This is particularly true of the "Captain John's Camp" (pl. 17), occupied by old people and by others who are poor; but in no case are the dwellings at all crowded. Most of the houses are surrounded by gardens and orchards, with fields or woods beyond.

The Hupa dress like the whites, the only exception being the basket cap, which is still worn on the head by the old women. Here also was noticed, however, a tendency to wear more clothing than the season required.

By occupation the people are principally farmers, every family possessing and utilizing an allotment of good land in the valley. They farm according to civilized methods and meet with a fair measure of success, raising mostly oats, but also quantities of brown beans, potatoes, wheat, corn, and hay, for which there is a good market at the school. The orchards furnish plenty of fruit, particu-

larly plums and apples; and in season the women gather quantities of acorns, preparations made from which are much liked by these people. Most of the families possess horses and wagons, but there are only a few cows on the reservation. A majority of the families keep also chickens and raise pigs. In the spring there is fishing, when the Hupa catch a great many eels and a limited number of salmon. Since the establishment of salmon canneries near the mouth of the river, few of the fish reach as far up the stream as the valley. The men also hunt in the valley and in the surrounding mountains, killing quail, rabbits, deer, and bear. The meat of the bear, however, is not eaten. A certain number of the Hupa men are employed by whites at the government school and also outside of the valley. As a result of these activities, there is usually but little want in the tribe, except among the aged, the sick, or the dissipated. About thirty of the old people receive biweekly limited rations from the Government. Nevertheless, there is no steady supply of nourishing, properly prepared, and regularly served food as there is among the whites living in the same region.

In their general habits the Hupa are domestic and less improvident than are numerous other tribes. They are intelligent and approachable. Drunkenness is infrequent. However, they still know very little concerning hygienic living. They do not take sufficient care against exposure to wet and cold, and they have no ideas about the prevention of sickness, particularly consumption. They still use basket bowls for soups, passing them freely to well and sick alike. These baskets are never properly cleaned and surely furnish one means of spreading tuberculosis.

MOHAVE

The Mohave are divided into two main groups, one settled about the Needles, Cal., and Fort Mohave, Ariz., in part reported by the writer in Bulletin 34 of the Bureau of American Ethnology, while the other—formerly the main body of the people—lives on the reservation along the Colorado river, 2 miles south of Parker, Ariz. The following notes apply to this latter group only.

The Colorado River Mohave number 465 individuals. They are, with few exceptions, of pure blood. Their reservation is of moderate size and is located in a part of the region where they have dwelt since ancient times. The land is covered with willows, cottonwoods, and mesquite along the river, but assumes a short distance from it the semidesert character of the surrounding country. The ground is flat and low, and a narrow strip near the river is subject to annual overflow. The soil is of fine sand and silt adobe, quite barren, but fertile when irrigated.

The climate is dry and warm. The summers are very hot, the mercury reaching, on some days, as high as 118° F. The nights during this season are warm, necessitating sleeping in the open. The winters are usually dry, delightful in the daytime and cool at night, without snow or frosts. In February and March and occasionally during the summer there are showers, but these are seldom heavy.

As to civilization, these people are in the transitional period. While clinging to their old habits, and living largely as they did before the advent of the white man, they nevertheless wear clothing similar to his, buy his household utensils, bedding, etc., possess horses and wagons, and follow him in other particulars. Their dwellings (pls. 18–22) are mostly large, well-made shelters, open on all sides, a mere frame of cottonwood posts and poles, supporting a roof of brush. In addition to these, a number of families have fairly substantial brush-adobe houses, used chiefly in the colder weather. All of the Mohave dwellings have floors of earth or sand. In the open shelters the warm, soft sand, when cleaned from all large particles by sifting, is suitably hollowed and used for a bed, particularly by the old people. It is also the playground of the little children. Yet this sand is at the same time the receptacle of remnants of food, of the expectorations of sick and well alike, and of filth from the chickens, all of which look diseased.

As already mentioned, the Mohave dress quite similarly to the whites. The calico dresses of the women are, however, of their own picturesque design, and moccasins are worn by the older people. During the summer young children and old men are often seen nude.

The Mohave men have no steady occupation. They make small plantings of corn, beans, and melons on a few clearings near the river and work at times on the irrigating ditch operated by the Government. So far, however, neither the farming nor the irrigation has proven very successful. Rabbits, quail, large mice, and occasionally waterfowl are hunted to some extent, and the families living nearest the river catch some fish. When opportunity offers, the able-bodied men work for the whites, but the occasions are not common.

In addition to doing housework, the women collect large supplies of native foods in season, particularly the mesquite beans and screw beans. They gather also young cactus leaves, cactus fruits, and numerous native seeds. The older women, in addition, make considerable beadwork for sale to the whites.

The diet of the Mohave consists of the above-mentioned native and cultivated articles, also of fish, meat, and wheat tortillas, together with crackers and canned fruits, which are purchased from the store. Mesquite beans and screw beans are collected in large quantities, cured

in the ground, by a certain process, and stored in great coiled baskets. They are cooked whole, or are ground and made into heavy, but sweet, nourishing bread. Meat is scarce. There is a native butcher from whom they purchase fresh or jerked beef when they have money. Cattle and even horses which have died from disease are eaten. Only one family keeps cows. Chickens are seen around every dwelling, but they are as poor and sickly a lot as could be found anywhere. Every family keeps several poor dogs, sometimes eight or ten, one of which is occasionally eaten. In common with the chickens the dogs act the useful part of scavengers. The old people on the reservation receive limited rations every two weeks from the agency. All things considered, poverty and want are more frequently witnessed in this tribe than in any of the others that were visited, with the exception of the Sioux. Their food supply is irregular; while some meals that the writer saw were tasty, nourishing, and plentiful, in many other cases meals were insufficient for proper nourishment. The natives best off in this respect are those who live at a distance from the agency, on clearings near the river.

In their habits the Mohave are domestic, though they are fond of traveling and visiting. They are mild-natured and approachable, and not averse to work, though under the present circumstances there is considerable idleness among the men. They are generally ignorant of hygiene, and in their homes there is frequently more or less squalor. Bedding and heavy articles of clothing are never washed. Food in general, especially meat that is being dried, is much exposed to flies. Personal cleanliness is imperfect. However, the boys are fond of bathing in the muddy river, and the girls like to wash their heads in the seepage water from the shallow wells. The sick and the aged are often neglected, and the rations which the latter receive are to a large extent consumed by their relatives.

Drunkenness is infrequent, owing to scarcity of liquor.

In the following pages are tabulated, for ready reference, the principal data concerning the five tribes studied.

TABLE 3.—*General data for tribes visited*

	Menominee.	Oglala Sioux.	Quinaielt.	Hupa.	Mohave (Colorado River Reservation).
Census, June 30, 1908: [a]					
Men	784	3,325	142	210	259
Women	680	3,338		216	206
	— 1,464	— 6,663		— 426	— 465
Census, June 30, 1907	1,375	6,688	141	424	482
Births—June 30, 1907, to June 30, 1908	52	292	.....	9	14
Deaths—June 30, 1907, to June 30, 1908	61	310	.....	8	31
Mixed-bloods (white-Indian)	Very nearly all	About two-fifths	Few	More than one-fourth	Scarcely any.
Civilization	Quite advanced	In transition period	Quite advanced	Advanced	In transition period.
Environment:					
Reservation	Large; well forested (pine and mixed).	Very large; almost barren (few pines).	Relatively large; thickly wooded (spruce, fir).	Moderate size; partially wooded (mixed).	Moderate size; wooded along river (cottonwood, willow, mesquite).
Surface	Flats and numerous small hills and depressions.	Flats, low hills and ridges.	Low and flat	Deep, isolated valley	River-flat.
Average elevation	825 feet	3,200 feet	Sea level to 100 feet	350 feet	400 to 500 feet.
Soil	Sand and clay	Alluvial silt in valleys, otherwise mostly sandy.	Loam and humus	Gravel; loam	Fine sand, silt-adobe.
Water	Abundant; rivers, ponds, lakes.	Rivers only	Abundant; sea, river, lake.	River	River.
Climate:					
Temperature	Relatively low	High, summer; low, winter.	Quite low, summer; mild, winter.	Hot, summer; mild, winter.	Very hot, summer; no frost, winter.
Moisture	Above general average.	Semiarid	Excessive, September to May; dry, June to August.	Excessive, September to May; dry, June to August.	Arid, except alnog river.

Winds	Seldom of great velocity.	High winds and storms occasionally.	Chilly fogs prevail in summer; some wind in winter.	Frequent, of moderate severity in winter.	Rarely high.
Amount of sunshine	Moderate	Above general average.	Below average	Above average in summer; below, in winter.	Much above average.
Dwellings	Fairly good log or frame houses.	Log houses with dirt floors; tipis; brush shelters.	Fairly good frame houses.	Fairly good log and frame houses.	Mostly open brush shelters; some rush and adobe houses.
Clothing	As among whites	Nearly as among whites.	As among whites	As among whites	Approximately as among whites; children and old men often nude.
Occupations	Logging, lumbering; but little farming.	Generally but few; some herding, and work for whites.	Fishing; basket-making (women).	Farming, fruit-raising; basket-making (women).	But little fishing and farming; some work for whites.
Food	Meat, especially salt pork; fish; some milk, berries, wheat bread, pastry, vegetables, coffee, tea. Little want except among aged.	Meat predominates; wheat bread, canned fruits, black coffee. Much want and irregularity.	Fish, bread, berries, purchased foods. No want.	Meat, fish, acorns, fruit, beans, bread. Little want, except among aged.	Fish, mesquite and screw beans, meat, native seeds and greens. Much want and irregularity, especially among aged.
Habits, etc	Much exposure in winter; fairly clean; alcoholism common.	Nomadic; frequent gatherings and visits; cleanliness imperfect; little drinking.	Much exposure to wet; cleanliness very imperfect; drink rare.	Much exposure in rainy season; young cleanly; aged live in squalor; drinking rare.	Open-air life; squalor in homes; aged neglected; drinking quite rare.

[a] Besides the births, some of the tribes, particularly the Menominee, have received during the year accessions of Indians who theretofore had lived outside of the reservation. This explains the apparent inconsistency of the census figures for 1907 and 1908.

Yet, notwithstanding the many differences shown in the preceding table, all the tribes visited suffer from tuberculosis in its several forms (except perhaps lupus) in quite constant proportions and to a much greater extent than the whites living in the same regions. This indicates that none of the above conditions can be regarded as of paramount importance in favoring the spread of tuberculosis among the Indians.

We come now to the Indian school at Phoenix. This school is a type of the large, advanced, nonreservation schools for the Indians. It receives pupils of both sexes, and of all ages from later childhood to advanced adolescence. As in all institutions of this nature, the pupils are obtained from various reservations through solicitation by the agents of the school. According to the present system of appropriations, the greater the number of scholars in the school the greater its allotment, the actual return for each scholar amounting to considerably more than $100.

The capacity of the Phoenix school is upward of 1,000 pupils, but to approximate this number would mean crowding. The institution is situated in the midst of the originally desert flats west of Phoenix, 3½ miles from the city, and equally distant from the nearest hills. The grounds of the school are limited in extent and are surrounded on all sides by private lands, many of which are built upon. This situation is not favorable to much outdoor exercise and recreation for the children. Besides this, some of the settlements in the neighborhood are occupied by consumptives. In fact, the district in which the school is situated is, as a whole, a Mecca for consumptives, particularly in winter, when the number of such patients in the valley reaches into the thousands.

The climate is that of the lower plains of southern Arizona, save that the effects of the heat during the long summer are intensified by the increased humidity due to widespread irrigation. The supply of drinking water is not of the best. On this account the school has a large distilling plant which provides almost all the water used.

The school buildings, including the workshops, were found to be roomy and well kept, and the class rooms leave little to be desired. The drainage, however, especially in the boys' dormitory, is very defective. The difficulties in this respect are due mainly to the level character of the country. Among the accessories of the school are a building originally devoted to gymnastics, which has now fallen into disuse, and a fine, large swimming tank which lacks the important requisite of an adequate supply of running water. The water is changed only once a week. The first day after the tank is filled the employees bathe; next come the girls, and during the remainder of the week the tank is used by the boys. It is in great favor with the children, whose enjoyment of the water is augmented by simple gymnastic apparatus placed over the tank. But, of course, the water soon becomes polluted. It then contains, besides other body emana-

tions, what has been washed and ejected from the noses and throats of those using the tank. As the water naturally enters the nasal and buccal cavities of the bathers, besides being sometimes swallowed, it must be regarded as dangerous to the health of the pupils.

The clothing of the children is sensible and comfortable. It is, however, so uniform that it can have but little pleasing or stimulating effect on their mentality.

According to the disciplinarian of the institution, the duties of the children in the Phoenix school are as follows:

Rising time, the whole year round, 5.35 a. m. Ten minutes for washing and dressing.

5.45 a. m. children are supposed to be in line. Roll call five to ten minutes' duration.

5.55 a. m. semimilitary drill; boys every morning, girls every other morning; no special duty for the girls during this time on days when free from drill. The drill lasts until 6.15 a. m. There is no regular drill during the summer vacation.

6.15 a. m. flag-raising ceremony.

6.30 a. m. to 7 a. m. march to breakfast and breakfast.

7 to 7.30 a. m. rest and dressing for work or school.

Working hours 7.30 to 11.30 a. m. and 1 to 4 p. m. During vacation 1 to 3 p. m. School hours 9 to 11.30 a. m. and 1 to 4 p. m.

Children of each sex are grouped; those who work in the morning go to school in the afternoon, and vice versa; and this order is reversed each month.

11.45 a. m. until 12.15 p. m. march to dinner and dinner.

12.15 to 12.50 p. m. change of clothing for those who work.

12.50 p. m. work and school call.

4 to 5.15 p. m. free, for those in school and for some of those who work.

5 to 5.15 p. m. time for washing, for those who were at work.

5.15 to 5.45 p. m. march to supper and supper.

5.45 to 7 p. m. free, except for those who are employed at necessary occupations.

7 to 8 p. m. night school, every week day except Thursday. On Thursday the matron and the disciplinarian have charge of the children and give them talks on topics in their lines.

8 to 8.20 p. m. free.

8.20 p. m. roll call, following which all go to their rooms, or dormitories, undress, lie down, and talk.

9 p. m. all talking must stop; lights go out.

Sundays are somewhat less strenuous. There is an inspection of about one hour's duration in the morning; then one hour of Sunday school; then dress parade, and change of uniform. In the afternoon there is from an hour to an hour and a half of church, the rest of the time being free; in the evening, from 7 to 8, singing of religious songs.

During midsummer children over 12 years of age get thirty days' vacation; under 12 years, sixty days. Those whose homes are far away, and some exceptional cases, remain at the school the entire summer. During the writer's visit there were at the school 125 boys and 95 girls who were without vacation.

According to the girls' matron, freedom beyond that allowed by the rules, is afforded the girls whenever possible; this is left largely to the discretion of the matron.

During the free intervals the children walk about the grounds of the school, or sit under the palms, and some scatter over the near neighborhood.

Statistical Data for Tribes Visited

In recording the cases of tuberculosis found in the tribes described above, subjects having pulmonary symptoms were divided into those in whom the presence of tubercle bacilli, or the physical condition and history of the patients, allowed no doubt as to the nature of the disease, and those as to whom the diagnosis was not entirely certain. Scrofulous glands were classified under three heads, namely:

(1) Had suppurated, but were now healed.

(2) Suppurating when observed.

(3) Had not suppurated.

Under the last heading were included only those in whom the enlarged glands were visible. The number of cases in which some enlargement was perceptible is much greater, but not possible of exact determination. Cases in which the person examined, or his relatives, gave a history of enlargements which had not suppurated and were no longer perceptible, had to be excluded from the statistics; for, on closer questioning, it was often found that the enlargements were of other than scrofulous nature, while in other instances their character remained uncertain.

Table 4.—*Results of examination (1908) of family groups*

Data obtained.	Menominee.[a]	Oglala Sioux.[a]	Quinaielt.[b]	Hupa.[b]	Colorado River Mohave.[b]
Number of family groups examined	100	100	15	87	79
Number of deaths from tuberculosis [c]	12	67	.....	6	7
from pulmonary tuberculosis	11	51	.....	4	6
per 1,000 of population	*8.0*	*12.4*	.....	*9.4*	*12.5*
Number of individuals in family groups examined	403	428	62	331	357
male	197	200	29	153	185
female	206	228	33	178	172
Number of cases of phthisis positively established	16	21	3	9	15
percentage of cases examined	*4.0*	*4.9*	*4.8*	*2.7*	*4.2*
male	8	9	1	4	7
percentage	*4.1*	*4.5*	*3.4*	*2.6*	*3.8*

[a] Examination in July. [b] Examination in August. [c] During fiscal year 1907–8.

TABLE 4.—*Results of examination in 1908 of family groups*—Continued

Data obtained.	Menominee.	Oglala Sioux.	Quinaielt.	Hupa.	Colorado River Mohave.
Number of cases of phthisis positively established—Continued.					
female	8	12	2	5	8
percentage	*3.9*	*5.3*	*6.1*	*2.8*	*4.6*
acute	1	0	0	0	0
percentage	*6.0*	*0.0*	*0.0*	*0.0*	*0.4*
subacute	3	5	0	3	*0*
percentage	*19.0*	*24.0*	*0.0*	*33.3*	*27.0*
chronic	12	16	3	6	11
percentage	*75.0*	*76.0*	*100.0*	*66.7*	*73.0*
distribution according to age—					
adults (above 20)	14	17	2	5	13
percentage	*77.8*	*81.0*	*66.7*	*55.6*	*86.7*
adolescents (14 to 20, inclusive)	2	2	1	3	1
percentage	*11.1*	*9.5*	*33.3*	*33.3*	*6.7*
children (under 14)	2	2	0	1	1
percentage	*11.1*	*9.5*	*0.0*	*11.1*	*6.7*
Number of cases indicating phthisis, but admitting of doubt	20	34	5	20	10
male	8	16	2	10	2
female	12	18	3	10	8
Number of cases of tuberculosis of neck glands	48	43	3	40	26
a had suppurated	31	25	1	21	18
b suppurating	3	7	0	6	3
cases of *a* and *b* together per 1,000 examined	*84.4*	*a74.8*	*16.1*	*81.6*	*58.8*
c had not suppurated	14	11	2	13	5
Number of cases of tuberculosis of bones	5	9	0	5	4
healed	3	6	0	4	1
active	2	3	0	1	3
Number of individuals free from suspicion of phthisis and other forms of tuberculosis	316	323	50	257	315
percentage of cases examined	*78.5*	*75.5*	*81.0*	*77.6*	*88.2*
Number of family groups free from suspicion of phthisis and other forms of tuberculosis	40	34	6	30	46
percentage of family groups examined	*40.0*	*34.0*	*40.0*	*34.5*	*58.2*

[a] Per 1,000 of population.

As to the Phoenix school, among the 220 children present there were 2 positive cases of phthisis of subacute form and 5 suspicious ones. A number of pupils who showed signs pointing to tuberculosis of the lungs were sent home during the current year. How some of the children succumb to the disease will be shown from the following illustration, for which the writer is indebted to the school physician. In November, 1907, there were brought to the school 28 new Papago pupils, an examination of whom showed that they were in good health. Before July, 1908, 5 of these pupils had already been sent back to the reservation on account of serious illness, pointing to tuberculosis. Two of those sent home have since died

of consumption. Two others of the same group of 28 children are among the above-mentioned 5 suspicious cases, showing a gradual failing, with slight cough.

From the above tables it is seen that the cases of phthisis positively established in these tribes amounted to from 3 to 5 per cent of their whole population—an appalling proportion. In addition to this, large numbers, particularly of the young, had at the time of examination, or had had in the past, tuberculosis of the cervical glands or of the bones. Among the Indians the pulmonary form generally involves both sexes in nearly equal proportion; nevertheless, all of these tribes show a slightly greater frequency of the infection in the females. This presents a contrast to the case of the American whites, in whom the males are the greater sufferers.

As to the ages of the patients, it is seen that a large majority of the afflicted were above 20. A much smaller proportion of cases was found in children under 14 years of age, as was true also of those between 14 and 20. If, however, similar statistics were gathered during the latter part of the winter and in the early spring, the proportion of adolescents and young adults attacked by the disease would probably be higher than that of the children or than that of the adults in excess of 35 years of age. For at that time of the year would be found a greater number of acute cases, which appear mostly in subjects between 16 and 35 years of age, and the majority of which before the advent of summer have been eliminated by death. Again, if tuberculin tests could be applied to the children it is very certain that a larger proportion of cases would be found in this group. Considering the adults alone, it was found that a greater number of cases of pulmonary tuberculosis existed among those in early and late adult life than among those between 35 and 55 years of age. In all these conditions among the Indians as compared with the whites no radically different features exist.

The cases in which positive diagnoses of phthisis could not be established, and which therefore are classed as doubtful, embrace, in all probability, instances of bronchitis of long duration, due to other causes than tuberculous infection. But they certainly include also cases of pulmonary tuberculosis of mild or very irregular character or encountered in the early or late stages of the disease. It is well known that under the latter conditions the tubercle bacillus is often absent from the sputum, or can be detected only after repeated examinations. Some of these doubtful cases presented many symptoms and some physical signs of pulmonary tuberculosis, yet, in addition to a negative sputum examination, other distinguishing features were absent, necessitating a reserve in diagnosis.

As to the varieties of phthisis encountered, the tables show but one truly acute case. As has been mentioned, such cases occur principally during the winter and spring and terminate in death or become subacute or chronic before midsummer. Some of the acute cases

formerly seen by the writer among the Indians, and others of which he learned personally on the reservations, are of very rapid course, terminating within a few weeks or two or three months. Subacute cases, with more moderate symptoms and a duration beyond three months, were well represented in all of the tribes. A decided majority, however, of the cases of consumption encountered were of the chronic type, with slow and irregular progress, and in many instances of more than a year's duration. Such cases often show a tendency toward recovery, and in every locality more than one individual was met with in whom symptoms of the disease, after lasting for years, had been followed by complete recovery. The subacute cases often become chronic and may progress to recovery. In many more instances, however, judging from past experience and the information obtained during the investigation here dealt with, such cases become aggravated and speedily result in death.

Tuberculosis of the cervical glands has been observed among the Indians in individuals of all ages, from early infancy to middle age. The youngest patient seen with this disorder was a girl one year old, in whom the glands had already suppurated. The oldest cases were two women, each about 45 years of age, and another woman who gave her age as 46. In the two former the swollen glands were clearly tuberculous, though not yet pointed; there were at the same time other signs of tuberculous infection, one being classed with the positively established cases of phthisis, the other with the doubtful. In the woman of 46 the glands were still suppurating, while lung symptoms indicated, at the same time, chronic consumption. Among the Mohave two moderately enlarged cervical glands, not suppurating, were seen in an old man about 85 years of age. The nature of these swellings could not be exactly determined, but the patient, whose sputum contained tubercle bacilli, had, so far as could be ascertained, no other disorder which might account for the glandular enlargements.

In the Indian tuberculosis of the bones usually attacks the spine, hip joint, ribs, or tibiæ. One case was seen in which the wrist was involved, and another in which a discharging sinus led to either the malar bone or the malar process of the superior maxillary bone.

Of the other forms of tuberculosis, it was found that in the young children the disease is especially apt to manifest itself in the meningeal form. Intestinal tuberculosis seems to appear only as a complication of tubercular process in other parts of the body.

The prevalence of tuberculosis in its various forms, among the tribes visited, is especially illustrated in the last two items in the tables, giving the proportions of individuals and of family groups totally free from any suspicion of the disease. Such family groups among the full-blood Oglala fall as low as one-third of all of those examined. In at least two-thirds, then, of the families of the Oglala Sioux there are some indications of tuberculous infection.

V. SYMPTOMATOLOGY

The symptoms manifested by tuberculous Indians are much like those seen in similar cases of the disease among the whites. Yet there appear to be a few interesting differences, and more detailed future studies may possibly establish others.

The rapid cases are characterized by all of the well-known symptoms of galloping consumption. The fever, sweats, and a rapid exhaustion of the patient are especially noticeable in the Indian. Emaciation in these cases is not extreme, while hemorrhages are liable to be profuse. Fatal termination is almost the rule.

The subacute, and especially the chronic cases, show, as among the whites, a gradual emaciation, with loss of strength; cough, annoying at night and especially in the morning; feverishness, particularly toward evening or night; hemoptysis; night sweats, and also more profuse sweating during the day. The feverishness is mostly irregular, and in some cases the patients complain more of chilliness than of heat. Expectoration is so scanty in some instances that it requires more than a day to obtain a fair sample of the sputum, while in other cases it is profuse. Hemoptysis seems to be the rule, but in these slower cases is rarely profuse. Subjective pains and tenderness on palpitation are present in all cases, though they are seldom of more than slight to moderate severity. Pain on pressure is especially noticeable in the interscapular region, along both sides of the spinal column. Pressure over the apices of the lungs is also painful, and occasionally there is hypersensitiveness here on percussion. The finger tips of many of these patients become clubbed, as in white consumptives; the supraclavicular, subclavicular, and intercostal spaces sink in, while the clavicles and scapulæ protrude. General but not excessive emaciation is met with.

On auscultation it is found that the upper lobes—right and left in about the same proportion—are generally affected first, and that they always suffer more than the lower. There are prolonged and audible expiration; sharp, harsh or hard inspiration; moist or crepitant, diffused or localized râles, and pronounced bronchophony over the infected areas. Occasionally there are plain signs of a cavity. In very old cases, where extensive fibrous changes have doubtless taken place, respiratory sounds over the apices may be quite audible.

In the chronic forms of pulmonary tuberculosis in the Indians, percussion is quite unsatisfactory. In a great majority of the cases there is an absence of pronounced dullness. Among the many chronic cases examined there was no instance in which the dullness of the affected lobes was as marked as that which is found in normal conditions, over the heart or liver. In numerous patients, where the presence of the bacilli in the sputum confirmed the diag-

nosis, it would have been impossible to base an intelligent opinion on percussion alone. There is always, however, diminished or irregular resonance. In cases of many years' duration, and in those who have recovered from chronic phthisis, there is a more or less flat sound over the apices, or over the whole of the upper lobes, which differs from the dullness of consolidation. In the acute cases seen in former years dullness seemed to be manifested to a greater degree.

In a large proportion of the more severe cases of consumption a secondary infection of the larynx is noticeable, and is attended by all the well-known symptoms of that complication.

The actual beginning of pulmonary tuberculosis is often referred by the Indian patients to an attack of pneumonia, pleurisy, grippe, "bad cold," and even measles; an insidious beginning was heard of less frequently.

The bacteriological examinations made during the investigation, while revealing interesting conditions in special instances, did not indicate the existence of any peculiar racial features. It is possible, however, that more numerous and elaborate examinations may show some peculiarities in the pulmonary excretions of the Indian consumptive.

As a rule, the cases of tuberculous cervical glands in the Indians run a mild course. In some individuals the swellings, after attaining certain proportions, gradually diminish in size until they become scarcely palpable. Suppuration is occasionally aggravated by a secondary infection, due to uncleanliness. In rare cases the ulceration becomes extensive; in a young Mohave woman, the sores involved the front of the neck, in an irregular manner, from the lower jaw down to the first rib. The scars left by suppurated glands have the same features as in the whites. Death in these cases occurs only from complications.

Nothing radically distinctive was observed in the cases of tuberculosis of the bones.

VI. ETIOLOGY

The etiology of tuberculosis among the Indians is a subject of particular importance. After as careful inquiry as was possible in the short time available, the following may be enumerated, in the order of their importance, as the causes of the disease, particularly in its pulmonary form, among these people.

(1) The most potent of all factors is the facility of infection, particularly during the cold or rainy season. The average Indian has no idea of the real nature of tuberculosis, or of the means by which it is propagated. He often lives in a good house, or in one that could easily be ventilated and kept clean. But his knowledge and habits

have not kept equal pace with the changes in his dwelling. In consequence he sees no harm in overheating his house in cold weather, and closing all cracks in it to prevent the entrance of cold air, destroying in that way nearly all ventilation. He visits freely dwellings where there are consumptives, and is in turn visited by such patients, in his house. It is not uncommon to find, especially in some of the tribes, a closed and heated room filled with visitors, all of whom expectorate on the floor, about the dwelling, and wherever they happen to go. Subsequent cleansing is always more or less imperfect, and thus, in the course of time, even the best dwellings are almost sure to become infected with tubercle bacilli. In dwellings of the less advanced types the conditions are even worse. But the danger of infection from expectoration is particularly great in houses provided with earthen or sand floors, such as are still common among the Sioux and the Mohave. The healthy and the unhealthy spit freely on these floors, the sputum being usually covered with a pinch of sand or earth and thus remaining. Its removal is at best rare or incomplete, and often, as in the pole-and-brush shelters built on sand, impossible. Various articles, as bags, quilts, blankets, etc., used alternately by different members of the family, and occasionally given away, are never washed or otherwise cleaned. In the course of time these must become impregnated with the infected dust, if not soiled with direct expectoration, and in this way propagate the disease. The tuberculous are in no way isolated. They eat with the same utensils as the rest of the family, and these utensils are not properly cleansed. They sleep with others until the symptoms of their disease become too annoying. Their soiled clothing is in no case washed separately. They visit their neighbors freely, and with rare exceptions they are permitted to expectorate anywhere without restriction. During these visits various articles, as pipes, spoons, and dishes are passed around, without cleaning, from the mouth of the consumptive to healthy mouths. Pipe passing is particularly in vogue among the Sioux. White consumptives come freely into contact with the Indians. Finally, bugles or other wind instruments and sometimes water cups, never sterilized, pass from mouth to mouth. Infection through these last-named sources is amply proven by the finding of numerous tubercle bacilli in most of the mouthpieces of the musical instruments examined on the expedition. Infection through actual contact of the lips need not be considered, because of the rarity of kissing among Indians. On the other hand, danger from utensils is greater than among whites, for the Indians still have here and there wooden spoons and basket or gourd dishes, which are more difficult to clean than metal or porcelain articles. All these conditions create, even among those Indians who live in the most modern dwellings, chances of infection unequaled in whole communities among the white people.

(2) Second only to the foregoing in seriousness in the propagation of tuberculosis among the Indians is doubtless the now frequent hereditary taint among the young. In a tribe such as the Sioux it would be very difficult, if not impossible, to find a family in which there have not been tuberculous individuals, some of whose progeny are congenitally predisposed to the disease.

(3) Related to the frequent hereditary taint in the Indian is his apparent lesser racial immunity from the disease. The existence of this factor seems to be demonstrated, but its exact value can not be determined until the Indian is observed under the same conditions of life as the whites. Doubtless much of what now appears to be greater racial susceptibility is a result of other conditions, particularly greater opportunities for infection, and malnutrition.

(4) A favorable condition for the development of the pulmonary form of tuberculosis, among the Indians as among the whites, is the presence of tuberculous glands or other tuberculous processes in an individual.

(5) All exposure to heat and cold which is liable to bring on abnormal conditions of the respiratory apparatus, actual disease of the air passages or the lungs, and frequent neglect of such conditions, strongly promote in the Indian the development of pulmonary tuberculosis. The infection in such cases would be less frequent, however, were the tubercle bacilli less numerous. Noteworthy here is the fact that, since assuming the white man's dress, the Indian often wears more clothing than he needs, thus making himself more susceptible to the inroads of disease.

(6) The influence of diseases other than those of the respiratory tract, on the development of tuberculosis among the Indians, is not certain. That of syphilis has surely been overrated; parasitic conditions need a special study; heart disease—mitral insufficiency of rheumatic origin—is very common, as stated before, among the Menominee. But no causative relation could be detected between this trouble and tuberculosis.

(7) Dissipation, indolence, and all other weakening conditions contribute, doubtless, as much to the susceptibility of the Indian to tuberculous infection as they do among the whites.

(8) Want and consequent debilitation are certainly responsible for a percentage of the cases of pulmonary tuberculosis among the Indians. Helpless poverty is only too apparent in many of the families, particularly among the old people who are often from necessity, habit, or other causes, more or less neglected by their relatives. In certain localities where there is poverty not apparent to the casual observer the food is ordinarily sufficient to sustain life, but, owing to the quality, it furnishes little or no surplus energy. Under such conditions, any extraordinary demand on the forces of

the body is likely to be followed by excessive tissue waste, making the individual an easy victim of tuberculous infection.

(9) The cows kept by the Indians, and the cattle slaughtered for food, in no instance have been examined for tuberculosis. In some of the tribes the people eat cattle which have died as the result of disease. As the meat is not always thoroughly cooked, the introduction of the tubercle bacillus into the system through this source is possible.

(10) In the nonreservation schools, a factor of importance is the depressing effect on the newly-arrived child, of a radically different environment. A child taken from a reservation where it has become accustomed to almost unrestricted freedom of will and motion, is subjected to discipline for at least four-fifths of its waking hours. In addition, there are the exertion of studying in a strange language, the change of associations, and homesickness, the lack of sufficient diversified exercise out of doors, and (to it) unusual food. All these influences can not but have a depressing and physically exhausting effect, which makes the pupil an easier prey to consumption.

(11) The mental attitude of the Indian must be taken into account because of its unfortunate effect on the course of the disease in many cases. The patient utterly gives up the fight against the disease as soon as he fully understands that he is infected. This is particularly true of the young, the adults showing occasionally some of the hopefulness often observed in the white consumptives.

(12) The mixed-breeds resulting from regular marriages between the Indians and the whites appear to be freer from tuberculosis than either the full-bloods, or the mixed-breeds due to clandestine unions.

(13) The effect of close intermarriage is as yet uncertain.

VII. THERAPEUTICS

An analysis of the causes of tuberculosis among the Indians leads naturally to consideration of the means of preventing or, at least, checking the ravages of the disease. In this only a beginning has been made. It must be regarded as a misfortune for the Indian that he is so isolated from the whites. Had he been in close contact with them, the white man in taking care of himself would have been obliged, before this, to take care of the Indian also, and tuberculosis would not have assumed so large proportions. But even as it is, means must to be devised for curbing the infection on the reservations and in the schools, for, aside from all considerations regarding the Indian, the white man needs to act for his own preservation.

In addition to preventive measures, suitable treatment must be given those already suffering from tuberculosis. One of the most important results of the investigation was the finding of a considerable number of cases in which no reasonable doubt could exist as

to the diagnosis, on the way to recovery or actually recovered. Such cases, which embrace all ages except perhaps the senile, were found in all the tribes, and in a number of instances had been watched for years by the local physicians. They prove clearly that pulmonary tuberculosis is by no means always fatal in the Indian, and justify any adequate measures that may be taken for the cure of the Indian consumptive.

The writer will now briefly state such measures, particularly in the line of prevention, as appear to him of especial importance.

The first, most important, and most difficult must be the combating of ignorance. The Indian must be taught how to live, how to prepare his food, how to take care of the young, of the old, and of the sick, and what precautions to use against the spread of consumption. His antiquated, erroneous notions concerning disease must be gradually dispelled, and be replaced by actual knowledge and a clear understanding of the nature of tuberculosis, as of that of other contagious infections. The teaching must be applied not only to the Indian adults, by means of lectures, demonstrations, special bulletins, and through the physicians, but, above all, by means of regular instruction to the children from the time of their entrance into the schools. For the children are free from many of the prejudices of the adult Indian, and what is imparted to them in a proper way will become a stable part of their mental equipment, regulating their actions throughout their lives. Not only that, but the children thus instructed would themselves influence their parents and relatives more than an outsider would. Care must be taken, however, to make these teachings not a burden of rules to be blindly accepted, but a part of the clear understanding and common sense of the Indian. It is believed that instruction in this line, on most of the reservations and in the larger schools, is exceedingly desirable, and should be furnished as soon as possible.

There is urgent necessity for the general introduction of a simple and practicable method for the disposal of the infected sputum. Make the Indian fear the sputum of the consumptives as it should be feared, and then provide him, or teach him to provide himself, with the simplest means possible for its isolation. Cheap and easily destructible articles, as toilet paper, are far preferable to the use of spittoons, the contents of which, in the absence of sewers, would be apt to prove a dangerous source of infection. The Indian should be taught to destroy the receptacles by burning, since fire is always to be had. The exclusion of flies, which disseminate the infected matter, particularly over food, is another necessity.

A further and very important step will be the isolation of all cases, under the care of the nurse and the physician. There will be

difficulties in the way, but they can be overcome. The problem presented demands careful study of the conditions on each reservation, and thorough preliminary experiments, particularly in the matter of housing the patients. This subject again will require a clear understanding by the Indians concerned of what is being done and the reasons therefor.

Further in the line of prevention, it is urged that wherever possible the earthen floors of the dwellings be replaced by those made of boards, which can be better cleaned. The habit of passing the pipe should be discouraged, as well as that of using and passing dishes and spoons which have not been properly cleaned. The use by others of clothing worn by consumptives, and of articles made or kept in their houses, should be prohibited, until such objects shall have been rendered aseptic. In this connection it is well to point out the advisability of obliging dealers in Indian curios to disinfect all fabrics and old articles coming from the reservations. Such articles often lie on the floors of infected dwellings and not a few are made by consumptives. The Navaho blankets are perhaps the freest from infection, the tribe being still about the healthiest of our Indians; nevertheless, the precaution should be carried out even with these. The danger of handling articles coming from Indian homes, particularly fabrics, before disinfection, needs to be well appreciated also in the various museums.

General cleanliness of houses and their contents, of clothing, and of the person should be encouraged among the Indians in the most thorough and systematic manner. In a few localities, visited during the writer's former journeys, it was noticed that some of the field matrons did very good work in this direction. It is thought that excellent use could be made of the Indian police in this work, under the instruction and supervision of the agency physician. These men, who are generally willing and intelligent, could be trained not only to spread among these people much useful information regarding tuberculosis and its prevention, but also to do regular duty as a sort of sanitary inspection corps; they could be actually constituted a corps of sanitary officers, who should visit monthly each dwelling in the territory assigned them, to report on its cleanliness. Such supervision would soon teach the people to keep their dwellings in a more hygienic condition. The inveterately neglectful or filthy should be punished as are drunkards or other transgressors. These measures should be accompanied by judicious efforts to raise the Indian's pride and ambition in the directions indicated.

In addition to the above measures, an improvement is called for in the nutrition of many of the Indians, particularly the aged. This is a serious problem and needs careful consideration. The most

important phase will be to provide all the able-bodied men with suitable and remunerative work, which should be, above all, of a nature to be enjoyed. The Indian is not inherently lazy.

Alcoholism should be repressed. The inclination to drink is, however, often due, as among the whites, to a deficiency in proper nourishment. Another and most important cause of drunkenness is the utter ignorance of the Indian as to its deleterious effects on his health.

No effort should be spared to bring the Indian medical service to the highest degree of efficiency and dignity.

Special precautions are called for in the large schools, particularly the nonreservation schools. In the first place, the tuberculin test should always be applied to those who are to be taken to such schools, and all cases where the reaction points to tuberculosis should be denied admission. Introduction of the child into the changed conditions of life should be very gradual. There should be ample opportunity for out-of-door play, and for the systematic exercise needed. Swimming pools must not be allowed to become polluted. Excursions away from the school, particularly into the hills, have shown very encouraging results and should be frequently undertaken. Other important desiderata for the pupils are nourishing food, eaten under the most enjoyable conditions, attention to individual cases, and care as to their general mental tone. The mouthpieces of musical instruments, cups for water, and faucets at which children drink, should be regularly disinfected, and the indiscriminate use of musical instruments should be discouraged. Weekly weighings of all the pupils should be practised, for a continuous loss of weight is one of the first and most important indications of failing health. The children should have no contact with consumptive teachers, employees, or outsiders and should be well instructed as to the dangers of tuberculous infection. Finally, all pupils who become seriously ill, without delay and without being made to feel that they are very sick, should be separated from the others, relieved of regular duties, and given special attention, particularly in regard to food and outings. If the child is kept until it has a well-developed case of phthisis and is then sent back to the reservation, the results are certain to prove unfortunate. Opportunity is given the child to infect objects with which it comes in contact, and possibly other pupils; it is deprived of a chance of cure, and is sent back at the height of the disease to infect the camp of the family. The schoolrooms are generally good, yet the open-air schools about to be introduced by the authorities of the Indian Office must certainly be regarded as a further step in the right direction. The principle should be extended also, where possible, to the workrooms and dining rooms for the children. Extermination of flies at the schools would aid in preventing infection.

If the steps above outlined are taken in a determined manner, it is certain that speedy progress can be made in preventing and curing tuberculosis among the Indians. Fortunately, improvement of existing conditions is being brought about as speedily as is practicable, by the Indian authorities.

In conclusion, it is well to reflect that whatever is done for the Indian in preventing and curing tuberculosis will be of potential civilizing influence for the race and will mean also an advance in the campaign against the other pathological conditions to which he is subject.

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BOUCHARDAT, M. L'Ann. de thérap., Par., 1861, 71.

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Pages 3–4: "According to Alex. Rencountre and others, the first case of scrofula (particularly) noticed among the Brulé Sioux occurred in 1869." . . . "I do not think the case referred to as occurring in 1869 was the first case of scrofula among them, but it certainly did not exist to an alarming extent before that time."

"The older Indians and their traditions say that scrofula, syphilis, and consumption were little or almost unknown among them until within the last 50 years."

Seemingly some connection between scrofula and introduction of cattle (rations) in 1868.

GUILBERT, CH. A. De la phthisis pulmonaire dans ses rapports avec l'altitude et avec les races au Pérou et en Bolivie. These, Par., 1862.

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Page 70: "The Araucanian tribes who occupy the country between the Cordilleras and the sea, below the 36th degree of southern latitude, are completely exempt of tuberculisation. The disease is equally unknown in Patagonia."

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"Scrofula is of frequent occurrence; phthisis is very prevalent among them and always fatal."

HILDRETH, S. P. On the climate and diseases of Washington county, Ohio. Amer. Jour. Med. Sci., Feb., 1830.

Treats of the period of the settlement of the region by whites, from 1788 to 1807.

Page 326: "The aborigines were subject to few diseases, and those of an inflammatory nature." . . . "Phthisis pulmonalis, at this early period, was a disease nearly or wholly unknown."

The above has reference more particularly to the whites. Appearance of a few cases in 1808, and slow increase thereafter are noted; also that scrofula too was increasing (1829).

HOLDER, A. B. Papers on diseases among the Indians. Med. Rec., N. Y., 1892.

Page 178: Maintains that the Indians were never free from tuberculosis or scrofula; blames "transition" period for the spread of the diseases.

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Gives abstract of reports of agency physicians from twelve reservations, in nearly all of which the disease is shown to be prevalent. Among the Hupa, however, "consumption very rare—only two or three per cent of deaths due to it. Scrofula is rare."

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Page 917: "It seems that the Indian was free from tuberculosis before his contact with the whites, living as he did in the open air and without alcohol."

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Pages 432–3: "Among the Osages I have known two cases of what I now suppose to have been white swellings, neither subject was more than fifteen years of age. One was of the knee, and the other on the ankle joint."

Page 435: "*Consumption.*—This disease but rarely occurs."

"I have known only a few instances of this complaint amongst the Indians, brought on by exposure. Intemperance is the principal cause of its prevalence amongst them."

Pages 444–5: "I have known *pulmonary consumption* to occur among the Indians. It is rarely seen, however, except in those addicted to intemperance; and even in these it is by no means so common as among the whites. It is worthy of notice that females are not so subject to the disease as males are. I have never known it to affect a person before puberty, and very seldom under twenty years of age. It appears in far the greater number between the ages of twenty and forty years."

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The article contains no data on scrofula.

JAMES'S account of S. H. Long's expedition, 1819–20, *in* Early Western Travels, Thwaite's ed., XVI.

Referring to the plains of the Platte, the upper Arkansas, and the Red River of Louisiana, the writer says, page 132: "It is true that few, if any, instances of pulmonary consumption occur among the Indians of this region. The same remark is probably as true of the original native population of New York and New England."

JESUIT RELATIONS, Thwaite's ed.:

VI, 263: le Jeune's relation, 1633–34.

Montagnais: "We had three persons in one cabin afflicted with scrofula—the son of the man whose ear was very disgusting and horrid from this disease; his nephew, who had it in his neck; and a daughter, who had it under one arm. I do not know whether this is the real scrofula; whatever it is, this sore is full of pus, and covered with a horrible-looking crust. They are nearly all attacked by this disease when young, both on account of their filthy habits and because they eat and drink indiscriminately with the sick."

No reference is made to scars following the sores. Possibly the author includes cases of pemphigo contagiosa.

——— XLI, 195: Father le Mercier's relation, 1653–54, New France Algonquians.

At Tadoussac a child "was afflicted in a frightful manner with scrofula on his neck, and his entire throat was being eaten away by it; while the little girl suffered from a hemorrhage which was reducing her to a skeleton."[a]

[a] Imperfect translation. Original reads: "Avoit un flux de sang qui la desechoit insques aux os."

JESUIT RELATIONS—Continued.

XLIV, 267: Relation of 1657–58.

Referring to a full-blood Huron girl, who was to become a nun in the convent, the writer says: "He (the Lord) visited her with a malady which is common enough among the Savages, being a kind of weakness, together with a slow fever; and this so exhausted her that she wasted away before our eyes with an inflammation, accompanied by a severe cough, which affected her whole chest to such an extent that her lungs were gradually destroyed."

——— LVII, 165: Relation of 1672–73.

"A poor woman . . . who had been consumptive for two years."

——— LXV, 47: Relation of 1696–1702.

Montagnais: Referring to the missionary among the people—"sometimes he is made ill by the stench of those who have scrofula, with whom he even drinks out of the same kettle."

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——— An account of two voyages to New England. Boston, 1865; original, Lond., 1675.

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LAFITAU, J. F. Mœurs des sauvages ameriquains, etc. Par., 2 vols., 1724.

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Vol. 2, pp. 360–61: The savages suffered with "maladies scrophuleuses, causées par la crudité des eaux, par les eaux de neige, qu'ils sont obligés de faire fondre dans les païs de chasse, pour boire, & pour faire cuire leur sagamité. C'est peut-être du même principe, & de ce qu'ils ont toûjours l'estomach & la poitrine découverte, qu'ils contractent une espece de phtisie, qui les minant peu à peu, en conduit la plus grande partie au Tombeau, & à laquelle ils n'ont pû encore trouver de remede."

". . . ces sortes d' infirmités . . . les prennent d' ordinaire à la fleur de l'âge."

LA HONTAN. New voyages to America. Two vols., Lond., 1703.

Contains observations on the Canadian Indians, period 1683–94.

II, 47: "it throws all of 'em into that Languishing Disorder, which we call a Consumption: They look pale, livid and ghastly like skeletons."

No notes on scrofula are given.

LEWIS AND CLARK. Travels to the source of the Missouri river, etc., 1804–1806. Lond., 1814.

Page 341, Chopunnish or Nez Perce: "They are generally healthy—the only disorders which we have had occasion to remark being of a scrofulous kind, and for these, as well as for the amusement of those who are in good health, hot and cold bathing is very commonly used."

Page 549: We "had a number of patients afflicted with scrofula, rheumatism, and sore eyes." "The scrofulous disorders we may readily conjecture to originate in the long confinement to vegetable diet."

LUCKLEY, GEO. Trans. Amer. Med. Ass., 1857, XI.

Page 215: "Throughout the country phthisis pulmonalis appears to be the most common nonspecific disease with the aborigines."

"On the coast and in the settled districts, although hardships and scarcity of food do not exist in any proportion to what is encountered in the interior, yet the same disease is even more common."

Page 216: "Strumous diseases are very common and are rapidly increasing. The most common of these are caries of the spine, morbus coxarius, and glandular ulcerations."

MATTHEWS, WASHINGTON. Consumption among the Indians. Trans. Amer. Clim. Ass., Phila., 1886.

Notes finding consumption everywhere, except in Owen's valley, California, but even there the symptoms of scrofula were not entirely wanting.

According to his observations, tuberculosis was less common in the tribes he knew, during his earlier observations.

Gives statistics of the diseases at several of the northern agencies.

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Page 142: "We have evidence that the wildest Indians in the earliest historic times were subject to consumption; yet they were not subject to it in a high degree, and it is probable that they suffered then from a different form of the malady to that which troubles the modern Indian. But we have evidence that scrofula begins to prevail among them when they cease to live by chase, and that it is a condition predisposing to consumption among them."

Gives information from the physicians at eastern and northern agencies, all relating to latter half of nineteenth century. No historical documents are included.

MAXIMILIAN'S travels in the interior of North America, *in* Early Western Travels, Thwaite's ed., XXII.

Treats of period 1832–34.

Page 236: Saukie Indians from lower Missouri—"One of their most distinguished warriors . . . suffered severely from consumption."

MORSE, J. A report to the Secretary of War of the U. S. on Indian Affairs, etc. New Haven, 1822.

Page 347, appendix: Referring to the Indians east of the Rocky Mountains and north of Missouri, the author states that they "are, in general, subject to few diseases. The venereal complaint is common to all the tribes of the North; many die of a consumption."

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Includes a letter on consumption among the Indians, by Dr. Z. Pitcher.

Speaking of the Chippewa, Ottawa, Menominee, Osage, Pawnee, Omaha, Kansas, Creeks, Cherokee, Choctaw, Seneca, Shawnee, and Delawares, the Doctor says:

Page 312: "Consumption is a disease familiar to all those with whom I have had any personal acquaintance; and I think also that I may go further, and state, without fear of contradiction, that it is prevalent among all the natives of the northern section of our continent."

The author learned of the disease among Mandan in Missouri, and from officers of the Hudson Bay Company regarding all tribes under their jurisdiction. It is his opinion that—

Page 313: "Consumption is of more frequent occurrence than scrofula among the Indians;" " . . . scrofula per se is oftenest to be seen in those tribes who stand, as it were, midway between the savage and civilized state; but even then not so often as consumption."

Page 315 (Pitcher): "So far as I am capable of forming an estimate of comparative frequency of both scrofula and consumption in the two races,[a] I should say that the result is decidedly in favor of the red man."

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Scrofula and consumption noted as generally prevalent among the Indians about Lake Winnipeg and along Nelson river. The article contains no material of special value.

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Reports phthisis to be very prevalent among the natives of the Aleutian islands, principally among the mixed-bloods who lead debilitating lives.

ROSS, A. Adventures of the first settlers on the Oregon or Columbia river. Lond., 1849.

Page 308: Tribe Oakinackens, and others—"The diseases most frequent among these people are indigestion, fluxes, asthmas, and consumption."

——— Adventures of the first settlers on the Oregon or Columbia river. Lond., 1849; *also in* Early Western Travels, Thwaite's ed., VII.

Page 111: Chinooks (period 1810–13)—"Consumption and the venereal disease are the complaints most common amongst them."

RUSH, B. Free thoughts upon the cause and cure of the pulmonary consumption. Medical Inquiries and Observations, 2d ed., Phila., 1794, I.

Page 196: "It [pulmonary consumption] is unknown among the Indians in North America."

STRATTON, THOMAS. Contribution to an account of the diseases of the North American Indians. Edinburgh Med. and Sur. Jour., 1849, LXXI, 269–83.

The paper contains Dr. A. Digby's and P. Darling's reports on consumption and scrofula among the Ottawa and Chippewa of the Manitoulin island and the Six Nations along the Grand river (period, 1840–48).

According to P. Darling there were among the 800 Ottawa and Chippewa who came under his observation—(*a*) from Oct. 10, 1840, to Aug. 16, 1841: treated, scrofula 2, "enlarged glands" 13, consumption not mentioned; (*b*) from Aug. 16, 1841, to Dec. 31, 1842: phthisis 12; no mention of scrofulous glands; (*c*) from Jan. 1, 1844, to Dec. 31, 1844: phthisis 4; no mention of scrofula; (*d*) Jan. 1, 1847 to Dec. 31, 1847: phthisis 3; no mention of glands.

According to Doctor Digby there were among the twenty-two hundred Indians belonging to the Six Nations, between March 1, 1847, and March 1, 1848, a total of 54 deaths, with 4 deaths from phthisis.

TSCHUDI, J. J. Über die geographische Verbreitung, dei Krankheiten in Peru. Oester. med. Wochenschr., Wien., 1846, 472–3.

Reports scrofula as being prevalent in Peru, especially along the coast; "but only among the white population and along the coast also among the Negroes. The Indians appear to be completely immune against this disease. And the same is true about tuberculosis."

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[a] That is, the whites and the Indians.

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Reports on ten years' observations on tuberculosis among the Oglala; gives but limited statistics.

WILKES, CHAS. Narrative of the U. S. exploring expedition, 1838–1842. Phila., 1845, IV.

Page 512: Among the Sachet, Oreg., "pulmonary complaints are very common, and occasion great suffering. The diseases most often met with are bronchitis, and tubercular consumption."

WILLIAMSON, THOMAS. The diseases of the Dakota Indians. Northwestern Med. and Sur. Jour., St. Paul, Minn., 1874, IV, 410–19.

Refers to the Sioux of Minnesota about the Lac qui Parle between 1835 and 1846. The article contains observations on about 1,000 individuals.

Page 412: "Of those over ten years old who died of disease, I think fully half died of consumption." "I do not think it was much more prevalent among the Indians than among our white population; while from the fact that they were all tainted with scrofula, their mode of life, etc., it might be expected that it would be very much more so."

"The great proportion of phthisis was chiefly owing to so few dying of other diseases."

Page 415: Scrofula certainly less prevalent among the Indians of the Plains subsisting on buffalo meat than among those under his observation; those of the Plains "generally appeared real healthy, with the exception of sore eyes."

WINDER, WM. On Indian diseases and remedies. Brit.-Amer. Jour. Med. and Phys. Sci., Montreal, Jan., 1846, I, 255–7.

Includes a report by Dr. P. Darling; otherwise the article is without value.

WOODRUFF, CHARLES E. Diseases of northern California Indians. Med. Rec., N. Y., Jan. 24, 1891, XXXIX, 104–6.

Hupa: Some among them say they had not consumption before the advent of whites. "At present time the disease is extremely prevalent and fatal."

The article contains no exact data.

INDEX

	Page
AGES, cases of tuberculosis by	25, 26
ANIMALS, DOMESTIC—	
Hupa	17
Menominee	10
Mohave	18, 19
Oglala Sioux	13
Quinaielt	15
APACHE—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
ARAPAHO—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
ARIKARA—	
mortality from tuberculosis	5
ASSINIBOIN—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
BACTERIOLOGICAL EXAMINATIONS	7–8
BANNOCK—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
BIRTH RATE of tribes investigated	20
BLACKFEET AGENCY, MONT., morbidity at, from tuberculosis	4
BREATHING in tuberculosis	28
BRONCHITIS, cases of approximating tuberculosis	26
CANTONMENT AGENCY, OKLA., morbidity at, from tuberculosis	4
CATARRHAL AFFECTIONS—	
Hupa	16
Menominee	9
CAUSES OF TUBERCULOSIS. *See* Etiology.	
CENTRAL STATES, tuberculosis among Indians of	2
CHEYENNE—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
CHEYENNE AND ARAPAHO AGENCY, OKLA.—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
CHIPPEWA—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
CIVILIZATION. *See* Culture.	
CLEANLINESS as a therapeutic measure	34
CLIMATE—	
influence on distribution of tuberculosis	6
Menominee	20–21
Phoenix Indian school	22
See also Physical environment.	
CLOTHING—	
as a factor in tuberculosis	31
CLOTHING—Continued.	
infection of	34
notes on—	
Hupa	16, 21
Menominee	9, 21
Mohave	18, 21
Oglala Sioux	12, 21
Phoenix Indian School pupils	23
Quinaielt	14, 21
CŒUR D'ALÈNE AGENCY, IDAHO—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
COLORADO RIVER AGENCY. *See* Mohave.	
COLORADO RIVER MOHAVE. *See* Mohave.	
COLVILLE AGENCY, WASH., morbidity at, from tuberculosis	4
COMANCHE, mortality among, from tuberculosis	5
COUGH as a symptom of tuberculosis	28
CROW AGENCY, MONT., morbidity at, from tuberculosis	4
CROW CREEK AGENCY, S. DAK.—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
CROWS, morbidity among, from tuberculosis	4
CULTURE, STATE OF—	
Hupa	16, 17
Menominee	9
Mohave	18, 19
Oglala Sioux	11
Quinaielt	14, 15
DEATH RATE. *See* Mortality.	
DEVILS LAKE AGENCY, N. DAK., morbidity at, from tuberculosis	4
DIAGNOSIS of tuberculosis	7–8, 24–27
DIET. *See* Food.	
DISINFECTION as a therapeutic measure	34, 35
DISTRIBUTION of tuberculosis	6
See also names of tribes.	
DRUNKENNESS. *See* Intoxicants.	
DWELLINGS, description of	29, 30
Hupa	16, 21
Menominee	9, 21
Mohave	18, 21
Oglala Sioux	11–12, 21
Quinaielt	14, 21
EASTERN CHEROKEE AGENCY, N. C., mortality at, from tuberculosis	6
ENVIRONMENT—	
school children	32, 35
tribes visited	20
See also Physical environment.	
ETIOLOGY OF TUBERCULOSIS, discussion of	29–32
EXAMINATIONS, PHYSICAL, character of	7–8

Page

EXHAUSTION as a symptom of tuberculosis... 28
EXPECTORATION as a feature of tuberculosis... 28
EXPOSURE as a factor in tuberculosis..... 31

FAMILY GROUPS, statistics of, regarding tuberculosis..... 24–25, 27
FEVER as a symptom of tuberculosis..... 28
FINGER TIPS in tuberculosis..... 28
FLATHEAD AGENCY MONT.—
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 6
FLIES, precautions against..... 33, 35
FOOD—
  as a factor in tuberculosis..... 31–32
  improvement needed..... 34–35
  notes on—
    Hupa..... 16–17, 21
    Menominee..... 9, 21
    Mohave..... 18–19, 21
    Oglala Sioux..... 12, 21
    Quinaielt..... 14, 15, 21
FORMS OF TUBERCULOSIS, statistical data for.. 24–27
  See also Morbidity, Mortality.
FORT APACHE AGENCY, ARIZ.—
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 6
FORT BELKNAP AGENCY, MONT.—
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 5
FORT BERTHOLD AGENCY, N. DAK.—
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 5, 6
FORT HALL, IDAHO—
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 5
FORT LEWIS AGENCY, COLO., mortality at, from tuberculosis..... 5
FORT MOHAVE SCHOOL, ARIZ. *See* Mohave.
FORT PECK AGENCY, MONT.—
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 5
FORT TOTTEN AGENCY, ARIZ., mortality at, from tuberculosis..... 6
FORT YUMA SCHOOL AND RESERVATION, ARIZ., morbidity at, from tuberculosis..... 4
FRENCH, relations of, with Menominee..... 9
FULL-BLOODS—
  Hupa..... 16
  Menominee..... 9
  Mohave..... 17
  Oglala Sioux..... 7, 11
  susceptibility to tuberculosis..... 32

GRAND JUNCTION (COLO.) INDIAN SCHOOL, tuberculosis at..... 2
GREEN BAY AGENCY, WIS.—
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 5
GROSVENTRES—
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 5

HABITS OF INDIANS—
  as a factor in tuberculosis..... 29–30
  of tribes visited..... 21
HALF-BREEDS. *See* Mixed-bloods.
HEART AFFECTIONS—
  as a factor in tuberculosis..... 31
  Menominee..... 10
HEMOPTYSIS as a symptom of tuberculosis. 28
HEMORRHAGES in tuberculosis..... 28
HEREDITY as a factor in tuberculosis..... 31
HISTORY OF TUBERCULOSIS among United States Indians..... 1–3
HOPI—
  morbidity from tuberculosis..... 4, 7
  mortality from tuberculosis..... 5
HUPA—
  conditions in general..... 20–21
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 5
  scope of investigations among..... 7–8
  statistical data regarding tuberculosis... 24–27

IGNORANCE as a factor in tuberculosis.... 29–30, 33
IMMUNITY from tuberculosis. *See* Susceptibility.
INDIAN OFFICE, work of..... 2, 3, 8, 36
  medical service..... 3–7, 35
  police..... 34
INDIAN SCHOOLS, conditions in..... 32, 35
  See also Phoenix Indian school.
INTERMARRIAGE as a factor in tuberculosis... 32
INTOXICANTS, use of—
  as a factor in tuberculosis..... 31, 35
  by tribes—
    Hupa..... 17
    Menominee..... 10
    Mohave..... 19
    Oglala Sioux..... 13, 14
  See also Habits.
IROQUOIS, morbidity among, from tuberculosis..... 4
ISOLATION as a preventive measure..... 33–35

JICARILLA AGENCY, N. MEX., morbidity at, from tuberculosis..... 4

KICKAPOO, morbidity among, from tuberculosis..... 4
KICKAPOO SCHOOL, KANS., morbidity in, from tuberculosis..... 4
KINDS OF TUBERCULOSIS, statistical data for.. 24–27
  See also Morbidity, Mortality.
KIOWA, mortality among, from tuberculosis. 5, 6
KISSING among Indians..... 30

LA POINTE AGENCY, WIS., mortality at, from tuberculosis..... 5
LEECH LAKE AGENCY, MINN., morbidity at, from tuberculosis..... 4
LEMHI AGENCY, IDAHO, morbidity at, from tuberculosis..... 4
LOWER BRULÉ AGENCY, S. DAK., morbidity at, from tuberculosis..... 4

MALARIAL AFFECTIONS (Menominee)..... 10
MANDAN, mortality among, from tuberculosis..... 5
MENOMINEE—
  conditions in general..... 8–10, 20–21
  heart disease..... 31
  morbidity from tuberculosis..... 4
  mortality from tuberculosis..... 5
  rheumatic disorders..... 31
  scope of investigations among..... 7–8
  statistical data regarding tuberculosis... 24–27
MENTAL ATTITUDE as a factor in tuberculosis. 32

MESCALERO APACHE— Page
morbidity from tuberculosis 4
mortality from tuberculosis 5
MEXICANS, effect on Indians of contact with . 6
MISSOURI VALLEY, tuberculosis among Indians of 2
MIXED-BLOODS 20
among Menominee 9
comparatively free from tuberculosis 32
MIXED-BREEDS. *See* Mixed-bloods.
MOHAVE—
conditions in general 20–21
dwellings 30
exceptional case of enlarged cervical glands 27
morbidity from tuberculosis 4
mortality from tuberculosis 5
scope of investigations among 7–8
statistical data regarding tuberculosis 24–27
MONTAIGNES, scrofula among 2
MORBIDITY from tuberculosis—
Indians 3–4, 6–7
negroes 6
whites 6
MORTALITY from tuberculosis—
Indians 3, 5–7, 11, 20, 24–25
negroes 6
whites 6
MUCKLESHOOT, mortality among, from tuberculosis 5

NAVAHO—
comparatively free from tuberculosis 6–7
conditions in general 34
morbidity from tuberculosis 4
mortality from tuberculosis 5, 6
NEAH BAY AGENCY, WASH., morbidity at, from tuberculosis 4
NEGROES OF UNITED STATES, mortality among, from tuberculosis 6
NEVADA AGENCY, NEV., morbidity at, from tuberculosis 4
NEW FRANCE TRIBES, scrofula among 2

OCCUPATION FOR INDIANS, importance of 35
OCCUPATIONS—
Hupa 16–17, 21
Menominee 10, 21
Mohave 18, 21
Oglala Sioux 13, 21
Quinaielt 14–15, 21
OGLALA. *See* Oglala Sioux.
OGLALA SIOUX—
conditions in general 11–14, 20–21, 27
morbidity from tuberculosis 4
mortality from tuberculosis 5
scope of investigations among 7–8
statistical data regarding tuberculosis ... 24–27
OKLAHOMA, tuberculosis among Indians in .. 6
OMAHA—
morbidity from tuberculosis 4
mortality from tuberculosis 6
ONEIDA, morbidity among, from tuberculosis 4
OTO—
morbidity from tuberculosis 4
mortality from tuberculosis 5

PAIUTE— Page
morbidity from tuberculosis 4
mortality from tuberculosis 5
PANGUITCH AGENCY, UTAH, mortality at, from tuberculosis 5
PAPAGO in Phoenix Indian school, tuberculosis among 25–26
PARASITIC CONDITIONS as a factor in tuberculosis 31
PASSING THE PIPE, relation of to tuberculosis 13–14, 30, 34
PAWNEE, morbidity among, from tuberculosis 4
PERCUSSION in chronic tuberculosis 28–29
PHOENIX INDIAN SCHOOL—
conditions in general 22, 25–26
investigations in 7–8
PHYSICAL ENVIRONMENT—
Hupa 16
Menominee 8–9
Mohave 17–18
Oglala Sioux 11
Quinaielt 14
PIEGAN, morbidity among, from tuberculosis 4
PIMA—
morbidity from tuberculosis 4
mortality from tuberculosis 6
PINE RIDGE AGENCY, S. DAK. *See* Oglala Sioux.
PONCA, mortality among, from tuberculosis . 5
POPULATION STATISTICS—
Hupa 16, 20
Menominee 20, 21
Mohave 17, 20
Oglala Sioux 11, 20
Quinaielt 14, 20
PORT MADISON INDIANS, mortality among, from tuberculosis 5
POTAWATOMI, morbidity among, from tuberculosis 4
POVERTY as a factor in tuberculosis 31–32
PREVENTION OF TUBERCULOSIS. *See* Therapeutics.
PUEBLOS comparatively free from tuberculosis 6
PURE-BLOODS. *See* Full-bloods.
PUYALLUP AGENCY, WASH., morbidity at, from tuberculosis 4

QUILEUTE, morbidity among, from tuberculosis 4
QUINAIELT—
conditions in general 14–15, 20–21
morbidity from tuberculosis 4
scope of investigations among 7–8
statistical data regarding tuberculosis ... 24–27

RECOVERY FROM TUBERCULOSIS, cases of 32–33
RED LAKE AGENCY, MINN., mortality at, from tuberculosis 5
RESPIRATORY APPARATUS, various disorders of—
Hupa 16
Menominee 10
RHEUMATIC DISORDERS—
Hupa 16
Menominee 10

	Page
ROSEBUD AGENCY, S. DAK.—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
ROUND VALLEY AGENCY, CAL.—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
SAN CARLOS AGENCY, ARIZ., mortality at, from tuberculosis	5
SAN JUAN AGENCY, N. MEX., morbidity at, from tuberculosis	4
SANTA FÉ AGENCY, N. MEX., mortality at, from tuberculosis	6
SANTEE SIOUX, mortality among, from tuberculosis	5
SAUK AND FOXES, OKLA.—	
morbidity from tuberculosis	4
mortality from tuberculosis	6
SCROFULA—	
among New France tribes	2
scrofulous glands classified	24,25
SEXES—	
morbidity	24-25,26
proportion of—	
Menominee	8
Oglala Sioux	11
SHAWNEE, morbidity among, from tuberculosis	4
SHOSHONI—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
SILETZ, mortality among, from tuberculosis	5
SILETZ AGENCY, OREG., mortality at, from tuberculosis	5
SIOUX—	
dwellings	30
extent of tuberculous infection	31
morbidity from tuberculosis	4
mortality from tuberculosis	5
pipe passing among	30
pulmonary tuberculosis among	2
See also Oglala Sioux, Santee Sioux, Yankton Sioux.	
SOUTHERN UTE, mortality among, from tuberculosis	5
SPUTUM OF CONSUMPTIVES, disposal of	33
STANDING ROCK AGENCY, N. DAK.—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
SUSCEPTIBILITY to tuberculosis	1,22,31,32
SWEATS as a symptom of tuberculosis	28
SWINOMISH, mortality among, from tuberculosis	5
SYMPTOMS OF TUBERCULOSIS in Indians	28-29
SYPHILIS as a factor in tuberculosis	31
TAHOLAH, Quinaielt village	14
TARASCO, diseases of chest among	2
THERAPEUTICS, discussion of	32-36
TONGUE RIVER AGENCY, MONT., morbidity at, from tuberculosis	4
TONKAWA, mortality among, from tuberculosis	5
TONSILITIS (Hupa)	16
TRIBES investigated	7
TRUXTON CANYON AGENCY, ARIZ., morbidity at, from tuberculosis	4
TUBERCULIN TESTS, use of	26,35
TULALIP AGENCY, WASH., mortality at, from tuberculosis	5,6
UINTAH AND OURAY AGENCY, UTAH, mortality at, from tuberculosis	5
UMATILLA AGENCY, OREG., morbidity at, from tuberculosis	4
UNITED STATES CENSUS REPORTS on tuberculosis among Indians	2,3
UTE, mortality among, from tuberculosis	5
UTE AGENCY, UTAH, morbidity at, from tuberculosis	4
WALAPAI, morbidity among, from tuberculosis	4
WALKER RIVER AGENCY, NEV., mortality at, from tuberculosis	5
WEIGHT as an index of health	35
WESTERN SHOSHONI AGENCY, NEV.—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
WHITES—	
compared with Indians regarding tuberculosis	26
effect on Indians of contact with	6-7
mortality from tuberculosis	6
susceptibility to tuberculosis	22,30
WICHITA, mortality among, from tuberculosis	5
WINNEBAGO—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
YANKTON SIOUX—	
morbidity from tuberculosis	4
mortality from tuberculosis	5
YUMA, morbidity among, from tuberculosis	4

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The village of Keshena

Dwelling in an ideal location

MENOMINEE VILLAGE AND ISOLATED HOUSE

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Log house of the smallest size

Log-and-plank house of average size

MENOMINEE HOUSES

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Home of a medicine-woman

MENOMINEE HOUSES AND FARM

MENOMINEE FRAME HOUSE

A large house of the best type

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Village of tents near the agency

Isolated house; the character of the country is here shown

OGLALA DWELLINGS

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OGLALA TENT DWELLINGS

In the lower picture may be seen strips of beef hanging from poles to dry

A small house of typical construction

A house of average size, with an exceptionally large window

OGLALA LOG HOUSES

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OGLALA DWELLINGS

Log houses, double and single, tents, and brush shelters

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QUINAIELT CHILDREN; SPECIMENS OF BASKETRY

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QUINAIELT VILLAGE OF TAHOLAH

Quinaielt river is here shown at high tide

OGLALA DWELLINGS

Triple log house under construction and temporary tent house

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The two dwellings on the left are the oldest and smallest houses seen among the Hupa. These are occupied by old people, while the remaining house is that of a younger couple of the family

A group in the northeastern extremity of Hupa valley

HUPA DWELLINGS

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Built of planks—a former type of construction

A portion of an orchard may here be seen

HUPA DWELLINGS

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HUPA FRAME HOUSE

A fair-sized dwelling of the better class

HUPA LARGE FRAME HOUSES

In the lower house the windows are on the other side and in the ends

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"Captain John's Camp"

HUPA DWELLINGS OF THE POORER CLASS

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Temporary brush shelter

Pole-and-brush shelter of a consumptive

MOHAVE SHELTERS

An unfinished house. In the foreground is a pile of screw beans and (on the platform) is a basket therefor

"Open-work" house

MOHAVE DWELLINGS

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Reed-and-adobe double house, with shallow well

Frame house, with attached pole-and-brush shelter

MOHAVE DWELLINGS

Pole-and-brush shelter, and (on the left) sweat house—one of the two remaining on the reservation. On the roof of the shelter may be seen a pile of screw beans

Reed-and-adobe house

MOHAVE DWELLINGS AND SWEAT HOUSE

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